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ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR 1991

HEARINGS

BEFORE A

SUBCOMMITTEE OF THE

COMMITTEE ON APPROPRIATIONS

HOUSE OF REPRESENTATIVES

ONE HUNDRED FIRST CONGRESS

SECOND SESSION

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PART 4

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DOE/MA-0098
Volume 1 of 5

United States Department of Energy
Fiscal Year 1991

Congressional Budget Request

Atomic Energy Defense Activities

Volume 1

Assistant Secretary,
Management and Administration
Office of the Controller
Washington, DC 20585
January 1990

DEPARTMENT OF ENERGY

FY 1991 CONGRESSIONAL BUDGET REQUEST

ATOMIC ENERGY DEFENSE ACTIVITIES

VOLUME 1

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Department of Energy
FY 1991 Congressional Request

Summary of Estimates by Appropriation
Budget Authority
(Dollars in Million)

	FY 1989 Actual	FY 1990 Approp.	FY 1991 Departmental Request
Appropriation Before the Energy and Water Development Subcommittees:			
Atomic Energy Defense Activities	$6,752,575	$7,722,905	$8,592,000
General Science and Research Activities	908,471	1,093,316	1,273,732
Isotope Production and Distribution Fund	(209)	16,016	0
Energy Supply Research and Development	1,848,973	1,892,087	2,085,237
Environmental Restoration and Waste Management	1,657,347	2,218,317	2,791,436
Uranium Supply and Enrichment Activities	(244,053)	(4,745)	0
FERC - Salaries and Expenses	108,760	114,918	122,750
Nuclear Waste Disposal Fund	366,832	295,156	292,833
Geothermal Resources Development Fund	75	74	80
Power Marketing Administrations:			
Alaska Power Administration	3,159	3,134	3,233
Bonneville Power Administration	159,517	258,200	170,100
Southeastern Power Administration	36,267	18,456	9,285
Southeastern - Continuing Fund	3,072	0	0
Southwestern Power Administration	15,389	25,257	20,107
Western Area Power Administration	271,145	294,218	298,464
Total, Power Marketing Administrations	488,549	599,065	501,189
Departmental Administration	213,848	202,185	224,427
Office of Inspector General	20,959	22,638	28,421
Total, Appropriation Before the Energy And Water Development Subcommittees	$12,122,127	$14,171,932	$15,912,105

Department of Energy
FY 1991 Congressional Request

Summary of Estimates by Appropriation
Budget Authority
(Dollars in Million)

	FY 1989 Actual	FY 1990 Approp.	FY 1991 Departmental Request
Appropriation Before the Interior and Related Agencies Subcommittees:			
Clean Coal Technology	187,800	554,000	456,000
Fossil Energy Research and Development	380,025	416,641	202,309
Naval Petroleum and Oil Shale Reserve	185,071	189,439	210,610
Energy Conservation	316,809	370,918	182,591
Energy Regulation	18,668	18,198	16,408
Emergency Preparedness	6,154	6,551	6,467
Strategic Petroleum Reserve	173,421	192,483	195,633
Strategic Petroleum Account	242,000	435,865	228,393
Energy Information Activities	62,856	64,319	66,608
Total, Appropriation Before the Interior and Related Agencies Subcommittees	1,572,804	2,248,414	1,565,019
Total, Appropriation Before the Energy and Water Development Subcommittees	12,122,127	14,171,932	15,912,105
Payment to States	2,249	2,249	2,343
Total, Department of Energy	$13,697,180	$16,422,595	$17,479,467

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1989 FTE USAGE	FY1990 -FY89	FY1990 CONGR REQ	FY1991 -FY90	FY1991 CONGR REQ
ENERGY & WATER SUBCOMMITTEE					
HEADQUARTERS	4,926	558	5,484	99	5,583
FIELD	9,480	-63	9,417	-179	9,238
SUBCOMMITTEE TOTAL	14,406	495	14,901	-80	14,821
INTERIOR SUBCOMMITTEE					
HEADQUARTERS	1,212	-42	1,170	-52	1,118
FIELD	917	12	929	-90	839
SUBCOMMITTEE TOTAL	2,129	-30	2,099	-142	1,957
GRAND TOTAL	16,535	465	17,000	-222	16,778
ADJUSTMENT				-16	-16
ADJUSTED TOTAL	16,535	465	17,000	-238	16,762

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1989 FTE USAGE	FY1990 -FY89	FY1990 CONGR REQ	FY1991 -FY90	FY1991 CONGR REQ
16-ENERGY SUPPLY RESEARCH AND DEV	958	118	1,076	7	1,083
HEADQUARTERS	678	119	797	7	804
FIELD	280	-1	279	0	279
19-URANIUM ENRICHMENT	62	5	67	0	67
HEADQUARTERS	52	4	56	0	56
FIELD	10	1	11	0	11
17-ISOTOPE PRODUCTION AND DISTRIB	0	2	2	0	2
HEADQUARTERS	0	2	2	0	2
20-GENERAL SCIENCE AND RESEARCH	69	37	86	12	98
HEADQUARTERS	69	37	86	12	98
23-ATOMIC ENERGY DEFENSE ACTIVITI	2,999	411	3,410	45	3,455
HEADQUARTERS	550	267	817	40	857
FIELD	2,449	144	2,593	5	2,598
27-ENV RESTORATION & WASTE MGT	68	113	181	20	201
HEADQUARTERS	68	36	96	20	116
FIELD	0	77	85	0	85
30-DEPARTMENTAL ADMINISTRATION	3,347	-200	3,147	0	3,147
HEADQUARTERS	1,692	-20	1,672	0	1,672
FIELD	1,655	-180	1,475	0	1,475
32-INSPECTOR GENERAL	189	51	240	16	256
HEADQUARTERS	189	51	240	16	256
34-ALASKA POWER ADMINISTRATION	31	4	35	0	35
FIELD	31	4	35	0	35
36-BONNEVILLE POWER ADMIN	3,310	-80	3,230	-100	3,130
FIELD	3,310	-80	3,230	-100	3,130
38-SOUTHEASTERN POWER ADMIN	38	2	40	0	40
FIELD	38	2	40	0	40
62-SOUTHWESTERN POWER ADMIN	186	-2	184	2	186
FIELD	186	-2	184	2	186
46-WAPA - POWER MARKETING	1,163	-20	1,143	-83	1,060
FIELD	1,163	-20	1,143	-83	1,060
58-WAPA - COLORADO RIVER BASIN	248	0	248	0	248
FIELD	248	0	248	0	248
52-FEDERAL ENERGY REGULATORY COMM	1,497	73	1,570	0	1,570
HEADQUARTERS	1,497	73	1,570	0	1,570
54-NUCLEAR WASTE FUND	268	-19	249	1	250
HEADQUARTERS	158	-11	147	4	151
FIELD	110	-8	102	-3	99
56-GEOTHERMAL RESOURCES DEV FUND	1	0	1	0	1
HEADQUARTERS	1	0	1	0	1
63-CLEAN COAL TECHNOLOGY	53	5	58	5	63
HEADQUARTERS	21	5	26	0	26
FIELD	32	0	32	5	37
65-FOSSIL ENERGY RESEARCH AND DEV	739	-22	717	-48	669
HEADQUARTERS	172	-35	137	18	155
FIELD	567	13	580	-66	496
70-NAVAL PETROL & OIL SHALE RES	92	-3	89	2	91
HEADQUARTERS	19	-1	18	2	20
FIELD	73	-2	71	0	71
75-ENERGY CONSERVATION	339	13	352	-44	288
HEADQUARTERS	208	10	218	-47	171
FIELD	131	3	134	-17	117
80-EMERGENCY PREPAREDNESS	69	2	71	0	71
HEADQUARTERS	69	2	71	0	71
81-ECONOMIC REGULATION	235	-29	206	-25	181
HEADQUARTERS	235	-29	206	-25	181
85-STRATEGIC PETROLEUM RESERVE	140	0	140	8	148
HEADQUARTERS	26	2	28	0	28
FIELD	114	-2	112	8	120
90-ENERGY INFORMATION ACTIVITIES	462	4	466	0	466
HEADQUARTERS	462	4	466	0	466
GRAND TOTAL	16,333	463	17,000	-222	16,778
ADJUSTMENT				-16	-16
ADJUSTED TOTAL	16,333	463	17,000	-238	16,762

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES

PROPOSED APPROPRIATION LANGUAGE

Atomic Energy Defense Activities

For expenses of the Department of Energy activities, [$9,656,034,000], $8,592,000,000, to remain available until expended, including the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for atomic energy defense activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed [208] 308 for replacement only including [19] 20 police-type vehicles, and purchase of one fixed-wing and one rotary-wing aircraft, for replacement only). (Energy and Water Development Appropriations Act, 1990.)

Department of Energy
FY 1991 Congressional Request

Summary of Estimates by Major Activity
Atomic Energy Defense Activities
Budget Authority
(Dollars in Millions)

	FY 1989 Actual	FY 1990 Approp.	FY 1991 Departmental Request
Weapons Activities:			
Research, Development and Testing	$1,839,434	$1,863,836	$1,884,575
Production and Surveillance	2,103,906	2,374,518	2,757,000
Program Direction	83,165	99,404	106,425
Total, Weapons Activities	4,026,505	4,337,758	4,748,000
Materials Production	1,942,708	2,092,324	2,413,000
New Production Reactors	60,000	298,948	363,000
Waste Tranportation & Site Mgmt	44,245	59,853	86,000
Verification and Control Technology	154,636	165,834	174,000
Nuclear Safeguards and Security	79,070	85,383	91,000
Security Investigations	43,288	40,582	65,000
Naval Reactors Development	630,000	642,223	652,000
Subtotal, Atomic Energy Defense Activities	6,980,452	7,722,905	8,592,000
Use of Prior Year Balances and Other Adju	(227,877)	0	0
Total, Atomic Energy Defense Activities	$6,752,575	$7,722,905	$8,592,000

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES

In support of the Administration's national security policies, defense activities in the Department of Energy are focused on five broad missions.

- Support the national security policies of the United States for a reliable nuclear deterrent, including the long-term effort to develop new production reactor capacity;
- Provide safe and environmentally sound operations to assure continued production capability in the complex;
- Provide safeguards and security for nuclear weapons, devices, materials, facilities, and information under DOE control;
- Provide treaty verification, intelligence and arms control support essential to national security and foreign policies; and
- Support the naval nuclear research and development effort essential to the U.S. Navy.

The Department's budget request for Atomic Energy Defense Activities is $8.6 billion in FY 1991. The FY 1991 request provides a reasonable distribution of funds for base program activities required for the production of nuclear weapons and materials in response to Department of Defense requirements for stockpile improvements consistent with national security needs. In FY 1991, there will be a continued emphasis on activities to bring our facilities into compliance with applicable regulations. Intensive efforts began in FY 1990 to improve the quality of operations at the Savannah River Site and the Rocky Flats Plant, and increases are required in FY 1991 for the continuation of these critical operational improvements. Additionally, as in previous years, this budget provides the necessary FTE staffing resources for management and oversight of reimbursable program activities.

The Department has identified a number of urgent unfunded FY 1990 requirements that will soon be provided through a reprogramming that will be proposed from within current appropriations. Specific unfunded requirements include operational improvements at the Savannah River Site and Rocky Flats Plant as noted above; provision of safe, secure trailers for weapons transportation; increased security clearances associated with accelerated program activities and reduction of the reinvestigation backlog; increased cost associated with recently authorized federal manpower; and the placement of the N Reactor on the Hanford site at Richland, Washington, in dry standby.

A brief summary of each program under Atomic Energy Defense Activities follows:

Weapons Research, Development and Testing - The Weapons Research, Development and Testing program objectives include designing, testing, and certifying new weapons; advancing the start-of-the-art weapons technology and the transfer of nonsensitive defense technology to the private sector; and monitoring the nuclear weapons stockpile to assure continued reliability and effectiveness. The funding level requested for FY 1991 will continue to provide the base capabilities of the Department's core nuclear weapons research, development and testing complex and for research on the Inertial Fusion program.

Weapons Production - The FY 1991 request for the Nuclear Weapons Production and Surveillance program supports the weapons production levels that are reflected in the current draft of the Nuclear Weapons delivery schedule developed jointly by the departments of Defense and Energy. Weapons production includes various types of bombs and warheads such as: the B-61 Tactical Bomb, the W80-0 Sea Launched Cruise Missile Warhead, and the W-88 TRIDENT II Warhead. The largest increase over FY 1990 is for continuation of two major initiatives that started in FY 1990: improvements to enhance the quality of operations at the Rocky Flats Plant, and the strengthening of the Nuclear Weapons Transportation Safety Program. Increases are also required to continue the Facility Capability Assurance Program to upgrade aging weapons production facilities, and for upgrades to enhance the security of weapons facilities.

Nuclear Materials Production - The Nuclear Materials Production program provides nuclear materials (principally tritium, plutonium, and enriched uranium), to meet requirements defined in the Nuclear Weapons Stockpile Memorandum. The demand for these materials require the operation of a complex of feed materials and fuel fabrication facilities, production reactors, and processing plants. However, at this time the program is not producing any new tritium or plutonium because the fundamental key to meeting the program's mission is the operation and maintenance of a safe, reliable production complex capable of responding to changing production demands. The program's first priority is to resume reactor production, and in FY 1990, significant steps towards restart of reactors at the Savannah River Site were initiated in a concerted effort to upgrade facilities, increase staff, and enhance the quality of operations through improvements to safety and human performance. In FY 1991, significant increases are required to: assure that production and processing facilities at Savannah River and other locations can be operated safely and reliably over the long term; for environmental, safety, and health projects to comply with regulations; and continue the complex-wide productivity retention facility enhancements and restoration efforts.

Verification and Control Technology - The Verification and Control Technology program supports the development and execution of U.S. national security and foreign policy in the areas of treaty verification, intelligence, and arms control. The request required for the FY 1991 program will provide for increased analytical support activities, continued construction of the Center for National Security and Arms Control, and start of construction activities for the Foreign Technology Assessment Center. Verification technology efforts will be reduced in FY 1991, particularly those related to the Threshold Test Ban Treaty Peaceful Nuclear Explosion Treaty, Chemical Warfare, Conventional Forces, and Special Nuclear Materials.

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Nuclear Safeguards and Security - The Nuclear Safeguards and Security program is responsible for developing measures to assure adequate protection of the Department's nuclear weapons, nuclear materials, facilities, and classified information against theft and sabotage, espionage and terrorist activity with emphasis shifting to protection against the insider threat. Technical support is also provided to international activities designed to minimize the proliferation of nuclear weapons. In the areas of classification and technology policy, this program protects classified and unclassified sensitive information critical to the national security; controls nuclear energy-related exports. The FY 1991 request provides increases to provide a more balanced program that will strengthen protection against insider threats.

Security Investigations - The Security Investigations program funds background investigations for DOE and contractor personnel who, in performance of their official duties, require security clearances permitting access to restricted data, national security information, or special nuclear material. The FY 1991 request includes increases for an additional security investigation requirement resulting from the implementation of the Personnel Security Assurance Program and increased activity at Savannah and Rocky Flats; and to reduce the backlog of reinvestigations by FY 1993.

New Production Reactors - The New Production Reactors program is responsible for the design and construction, of new production reactors to meet national security requirements. The FY 1991 request is $363 million. Two preferred reactor technologies and sites have been recommended, a Heavy Water Reactor at the Savannah River Site in South Carolina, and a Modular High-Temperature Gas-Cooled Reactor at the Idaho National Engineering Laboratory. Development and project design activities will be tailored to maintain the preferred reactor technologies on the same schedules for start of construction. As a contingency, Light Water Reactor tritium target development activities and resolution of institutional issues associated with the acquisition at the NWP-1 reactor at the Hanford site will also be pursued. The proposed strategy to bring new production reactor capacity on-line is to proceed on an urgent schedule with preparation of an Environmental Impact Statement (EIS) concurrently with confirmatory development and project design activities tailored to the status of each technology. A final decision on new production reactor capacity technologies and sites will be made after completion of an EIS and a formal Record of Decision.

Funding will continue to support the planning and development of a program strategy and overall management to ensure safety, quality and environmental protection as well as the timely completion of new facilities. Activities will include compliance with NEPA requirements; conceptual design of the reactors; development of the safety review process; initiation of facility engineering and design, and long-lead procurements; and tritium target development.

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Naval Reactors Development - The Naval Reactors Development program carries out nuclear propulsion development work essential to the U.S. Navy. Work will continue to improve existing submarine and surface ship reactors and plant components, and to develop advanced reactor concepts and propulsion plants. Major efforts include an Advanced Fleet Reactor which will concentrate many of the current advances in reactor concepts, components, and materials to power a new generation of nuclear powered attack submarines. The FY 1991 budget request of $652 million maintains the Advanced Fleet Reactor effort on schedule, and also continues the 10-year extensive servicing and refueling effort for the eight land-based prototype naval reactor plants.

Waste Transportation and Site Management - This program provides for Department-wide nuclear material transportation requirements, maintains a site-wide infrastructure at Idaho and Hanford, and provides salaries and benefits for personnel responsible for administrative and technical support of the Environmental Restoration and Waste Management program.

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VOLUME 1

WEAPON ACTIVITIES

DEPARTMENT OF ENERGY

FY 1991 CONGRESSIONAL BUDGET REQUEST

ATOMIC ENERGY DEFENSE ACTIVITIES

VOLUME 1

WEAPONS ACTIVITIES

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Department of Energy
FY 1991 Congressional Budget Request
Atomic Energy Defense Activities
Weapons Activities

Program Overview

Mission

The Department of Energy's weapons activities support the United States national security policy of nuclear deterrence. This mission is carried out through the Weapons Research, Development, and Testing and Weapons Production and Surveillance program activities. The Weapons Research, Development, and Testing capability supports force structure requirements, promotes technological advancement, and prevents technological surprise by timely identification and understanding of potential threats to United States national security. The Weapons Production and Surveillance program activities encompass the production, maintenance, and retirement of nuclear weapons in accordance with quality, quantity, and schedule requirements contained in the Nuclear Weapon Stockpile Memorandum, which is developed jointly by the Departments of Defense and Energy, and approved annually by the President. The Weapons Activities program also includes national emergency preparedness assets and emergency operations activities. And, of course, these activities must be conducted in a safe, secure, and environmentally-sound manner.

Fulfilling these mission responsibilities requires balancing resources among and between program activities so that near-term commitments are met and adequate preparations for the future are made.

Program Objectives

Meet Near-Term Requirements (FY 1991-1995)

- Improve the conduct of operations to comply with applicable environmental, health, and safety requirements.
- Produce weapons to meet force structure requirements.
- Maintain the weapons in the stockpile.
- Conduct design, engineering, and stockpile certification activities.
- Optimize warhead safety, performance, and producibility.
- Conduct research related to threat assessment.
- Maintain technical excellence in critical technologies and capabilities.

Prepare for the Future (FY 1996 and Beyond)

- Explore what is possible - insure against technological surprise.
- Prepare for potential limits on testing (lower thresholds/lower numbers); including development of enhanced above ground experimental capabilities.
- Conduct additional underground tests to improve warhead predictive performance.
- Explore technical feasibility of nuclear directed energy weapons.
- Maintain a production readiness posture.
- Revitalize the infrastructure.

Priorities:

Program and activities in support of these objectives are conducted within the context of these priorities:

- Comply with environmental, health, and safety laws, regulations, and requirements;
- Comply with DOE Orders and instructions;
- Production;
- Noncritical maintenance; and,
- Performance improvement.

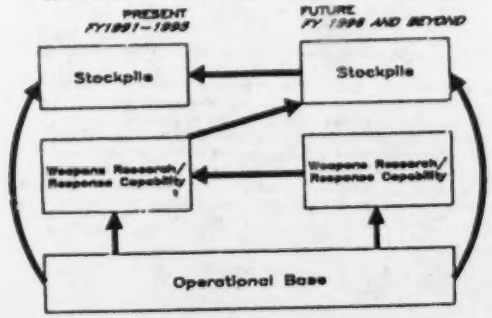
Framework

The Weapons Research, Development, and Testing and Production and Surveillance programs can be categorized into three major functional activities: stockpile, weapons research and response capability, and operational base. Each of these contributes to meeting both near-term and future program objectives.

Stockpile activities encompass weapons research, development, engineering, testing, and production and stockpile maintenance and evaluation activities. The Weapons Research and Response Capability category contains programs and special facilities for research into advanced concepts, nuclear directed energy and inertial fusion. The Operational Base for Weapons Research, Development, and Testing, and Production and Surveillance contains the activities and facilities to maintain the weapons production base, as well as support critical technologies for the research, development, and testing technology base. Most facilities and capital equipment are included in the operational base.

Each functional category contains activities geared to the "present" and the "future." The following diagram illustrates the interdependency of each element:

Maintaining Weapons Program capabilities requires contributions from each functional element:



The vitality of the weapons program depends on the continued viability of each of these elements. Conceptually, a weapon "begins" with the identification of a military application and long term research, such as that conducted on advanced concepts, or basic research associated with nuclear directed energy or inertial fusion. Funding for this is contained in the Weapons Research/Response - Future block. As some of this research matures, it moves to Weapons Research/Response - Present, as indicated, to be developed into potential weapon concepts. The Present-oriented objective here is to determine concept feasibility in the five-year period. Some of these concepts will be candidates for weapons to be included in the Nuclear Weapon Stockpile Memorandum. As such, they will pass into the development engineering stage, and will be funded in Stockpile - Future, since they would have an Initial Operational Capability date in the future; that is, beyond FY 1996. And ultimately, when a weapon goes into production, and enters the stockpile to be maintained, evaluated and eventually retired, it passes to the Stockpile - Present block.

As indicated on the figure, the Operational Base supports the entire process, both with capabilities and facilities. A large portion of the operational base is composed of the weapons production base - sustaining the operations of the seven government owned, contractor operated facilities for weapons production. Another significant portion is devoted to maintaining technical excellence in our critical technologies at the laboratories--disciplines such as physics, mathematics, materials science, engineering, and diagnostics development. Another aspect supports the operations of the Nevada Test Site.

Looking at the program in this manner allows decisionmakers to focus on the importance of each program element in assuring the continuity of the program in the future.

Issues

The Weapons program is facing many new issues in FY 1990 and FY 1991. Along with several complex new weapon systems in the preproduction phase, the complex continues to struggle with the transition of the program into the next century. The challenge is to balance near term requirements with investments for the long term viability of the weapons complex.

The advent of an era of heightened focus on environmental, safety and health elements and strict compliance with regulations is the single biggest driver of new requirements in meeting mission responsibilities. Repeatedly over the past year, assessments and reviews have shown the need for improvement to the quality of operations at most of our weapons production plants. Similar assessments will soon be undertaken throughout the research, development, and testing facilities. Addressing these requirements to make urgently needed changes to improve the quality of operations at our sites is the Department's highest near term priority. It is expected that these activities will consume an increasing proportion of our resources in the near future. The transition to a safer, cleaner and more responsible weapons complex is underway; however, uncertainties about the scope and magnitude of compliance and cleanup activities will challenge our abilities to meet production requirements while maintaining needed operational base capabilities and capacities in the interim.

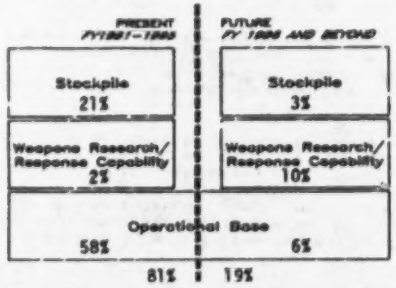
Another aspect of assuring greater safety to employees and the public deals with weapon safety. As part of a renewed joint effort on the part of DOE and the Department of Defense, improvements are continuing to enhance the safety of the nuclear weapons stockpile. However, these efforts require substantial investments in the near term -- from continuing with the Stockpile Improvement Programs for weapons currently stockpiled to initiatives to enhance safe secure transportation capacity for ground transportation of weapons and weapon components.

Supporting the arms control negotiations process is another Weapons Activities mission requirement which has taken on even greater importance recently. The DOE, by its unique capabilities in the research and development laboratories, makes contributions in threat assessment, preparation for potential testing limitations, and verification. These expanded responsibilities are important to future national security policies, and ways must be found to support them in balance with meeting our near term requirements for operational improvements and weapons production.

FY 1991 Budget Request

The following depicts the FY 1991 budget request broken down by the three major functional activities and their focus either on meeting near term (FY 1990-FY 1995) commitments (the present) or on preparing for the future (FY 1996 and beyond). As indicated, the majority of the budget request is allocated to meeting near term objectives.

Program balance between present and future and among program elements:



Improvements in Quality of Operations at the Rocky Flats Plant

Significant events during the past year have created new and dynamic pressures on the Rocky Flats Plant operation. Recommendations for improvements have been made by various review/audit teams resulting in increased funding requirements. Some of the most significant events affecting the increased funding request for the Rocky Flats Plant included internal Technical Safety Appraisals, new DOE Order Requirements, the FBI/EPA Plant investigation, DOE Headquarters Tiger Team environmental assessment, and the Agreement in Principle between DOE and the State of Colorado. The budget request is formulated to support the new DOE emphasis on accountability in the areas of health, safety and the environment. For Rocky Flats, funds are requested to provide critical plant operational improvements to respond to various review/audit team findings. The budget request supports plans to accomplish the key DOE goal of immediate, significant improvements in the areas of health, safety and the environment.

The request for Rocky Flats includes significant increases over the base level to permit operational and facility safety and health upgrades and supports DOE policy of conducting operations in full compliance with the letter and spirit of applicable Federal, state, and local health, safety and environmental statutes and agreements. Activities will be in four major areas: Plant Improvements, Conduct of Operations, Environmental, and Communications.

Plant improvements include activities with primary emphasis on plutonium residue reduction, as well as facility and equipment upgrades. Conduct of operations activities relate directly to continued assurance of safe, secure and reliable operations. This area addresses the programs for implementation of an enhanced Plant Quality Program, implementing a nuclear facilities operations manual, health and safety initiatives, security and safeguards improvements, and intensified training. Environmental activities include initiatives directed to programs for environmental protection rather than remediation. Finally, Communications activities will focus on opening new channels of communication with all public and plant employees to demonstrate that the Rocky Flats Plant is dedicated to the culture of accountability in the areas of environment, safety and health.

Making these improvements will mitigate undue risk taking and the further erosion of the public's confidence in operations of the Rocky Flats Plant, and allows timely execution of legal obligations. These actions will reduce the likelihood of facilities/plant being shut down and not being capable of meeting current and future workload as stated in the Nuclear Weapons Stockpile Memorandum.

Transportation

Another aspect of enhanced safety concerns the transportation of nuclear weapons. A joint DOE/DOD study is underway to examine transportation safety for weapons and weapon components. As a result of DOE analysis, we have determined that ground shipment of certain older weapons could significantly improve DOE's safety posture in this important area. Pending completion of the study, targeted for October 1990, the request contains additional funding to expand DOE's safe secure transportation network, including procurement of additional trailers which requires substantial lead time.

Funding Summary ($ in Thousands)

	FY 1989	FY 1990	FY 1991
Research, Development, and Testing	$1,435,627	$1,480,189	$1,525,871
Core Program	240,345	214,421	191,904
NDEV	$1,675,972	$1,694,610	$1,717,775
Subtotal	163,462	169,226	166,800
Inertial Fusion	$1,839,434	$1,863,836	$1,884,575
Total RD&T	2,103,906	2,374,518	2,757,000
Production and Surveillance	83,165	99,404	106,425
Program Direction	$4,026,505	$4,337,758	$4,748,000
Total Weapons Activities			
Total Staffing - FTE's	1,984	2,053	2,068

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

LEAD TABLE

Weapons Research and Development

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
Core Program						
Operating	$ 757,349 a/	$ 777,488 h/	$ 777,488	$ 813,664	$ +36,176	+ 5%
Capital Equipment	84,839 b/	90,487 i/	90,487	91,300	+ 813	+ 1%
Construction	108,142 c/	138,286 j/	138,286	132,747	- 5,539	- 4%
Subtotal	$ 950,330	$1,006,261	$1,006,261	$1,037,711	$ +31,450	+ 3%
Nuclear Directed Energy Weapons						
Operating	$ 109,790 d/	$ 93,696 k/	93,696	$ 91,211	$ - 2,485	- 3%
Capital Equipment	7,701 e/	5,910 j/	5,910	7,300	+ 1,390	+24%
Construction	15,237	18,715 m/	18,715	5,000	-13,715	-73%
Subtotal	$ 132,728	$ 118,321	$ 118,321	$ 103,511	$ -14,810	-13%
Inertial Fusion						
Operating	$ 155,530	$ 160,617 n/	$ 160,617	$ 157,900	$ - 2,717	- 2%
Capital Equipment	7,932 f/	8,609 g/	8,609	8,900	+ 291	+ 3%
Construction	0	0	0	0	--	--%
Subtotal	$ 163,462	$ 169,226	$ 169,226	$ 166,800	$ - 2,426	- 1%
Environment, Safety and Health - Construction	$ 5,400 g/	$ 0 g/	$ 0	$ 0	$ --	--%
Safeguards and Security - Construction	15,800	7,880 g/	7,880	1,000	- 6,880	-87%
Total R&D	$1,267,720	$1,301,688	$1,301,688	$1,309,022	$ + 7,334	+ 1%
Summary						
Operating Expenses	$1,022,669	$1,031,801	$1,031,801	$1,062,775	$ +30,974	+ 3%
Capital Equipment	100,472	105,006	105,006	107,500	+ 2,494	+ 2%
Construction	144,579	164,881	164,881	138,747	-26,134	-16%
Total R&D	$1,267,720	$1,301,688	$1,301,688	$1,309,022	$ + 7,334	+ 1%
Staffing FTE's	144	144	144	144		

Footnotes for Research and Development Lead Table

a/ FY 1989 Appropriation - $780,500,000. Reflects transfer of $21,386,000 to the Office of Environmental Restoration and Waste Management. Reflects transfer of $1,765,000 to Weapons Program Direction.

b/ FY 1989 Appropriation - $89,730,000. Reflects transfer of $1,550,000 to the Office of Environmental Restoration and Waste Management. Reflects $3,341,000 reprogrammed for Defense Waste and Materials Production activities.

c/ FY 1989 Appropriation - $108,652,000. Reflects transfer of $510,000 to the Office of Environmental Restoration and Waste Management.

d/ FY 1989 Appropriation - $113,790,000. Reflects transfer of $4,000,000 to the Office of Environmental Restoration and Waste Management.

e/ FY 1989 Appropriation - $8,000,000. Reflects $299,000 reprogrammed for Defense Waste and Materials Production activities.

f/ FY 1989 Appropriation - $8,240,000. $308,000 reprogrammed for Defense Waste and Materials Production activities.

g/ FY 1989 Appropriation - $25,000,000. Reflects transfer of $19,600,000 to the Office of Environmental Restoration and Waste Management.

h/ FY 1990 Appropriation - $802,770,000. Reflects transfer of $11,354,000 to the Office of Environmental Restoration and Waste Management. Reflects the transfer of $1,886,000 to Weapons Program Direction. Reflects sequestration of $12,042,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177).

i/ FY 1990 Appropriation - $93,875,000. Reflects transfer of $1,980,000 to the Office of Environmental Restoration and Waste Management. Reflects sequestration of $1,408,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177).

j/ FY 1990 Appropriation - $161,130,000. Reflects transfer of $727,000 to the Office of Environmental Restoration and Waste Management. Reflects sequestration of $2,117,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177).

k/ FY 1990 Appropriation - $97,000,000. Reflects transfer of $1,849,000 to the Office of Environmental Restoration and Waste Management. Reflects sequestration of $1,455,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177).

l/ FY 1990 Appropriation - $6,000,000. Reflects sequestration of $90,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177).

m/ FY 1990 Appropriation - $19,000,000. Reflects sequestration of $285,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177).

n/ FY 1990 appropriation - $165,200,000. Reflects transfer of $2,105,000 to the Office of Environmental Restoration and Waste Management. Reflects sequestration of $2,478,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177).

o/ FY 1990 Appropriation - $8,740,000. Reflects sequestration of $131,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177).

p/ FY 1990 Appropriation - $19,000,000. Reflects transfer of $19,000,000 to the Office of Environmental Restoration and Waste Management.

q/ FY 1990 Appropriation - $8,000,000. Reflects transfer of $120,000 to the Office of Environmental Restoration and Waste Management.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

SUMMARY OF CHANGES

Weapons Research and Development

FY 1990 Appropriation	$1,301,688
Adjustments	0
FY 1991 Base	$1,301,688
Research and Development Core Program	
· Supports an aggressive technology transfer program	+ 10,000
· Supports operating activities for Research and Development at a reduced level of effort	+ 26,176
· Maintains capital equipment asset base	+ 813
· Supports ongoing and new construction projects including revitalization	- 5,539
Nuclear Directed Energy Weapons	
· Supports operating activities at a reduced level	- 2,485
· Reduces funding for capital equipment asset base and ongoing construction projects	- 12,325
Inertial Fusion	
· Supports operating activities at a reduced level	- 2,717
· Provides for capital equipment to support the operating program	+ 291
Safeguards and Security Construction	
· Supports ongoing construction projects	- 6,880
FY 1991 Congressional Budget Request	$1,309,022

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KEY ACTIVITY SUMMARY

WEAPONS ACTIVITIES

I. Preface: Weapons Research and Development

The Weapons Research and Development program provides the primary scientific and technological underpinning for United States nuclear deterrence. This program is vital because nuclear deterrence has been, and continues to be, the foundation of the U.S. national security. These activities form the key elements vested in the Department of Energy (DOE) weapons program by the Atomic Energy Acts of 1946 and 1954, as amended.

The goals of the research and development program are to maintain the reliability and credibility of the nuclear weapons stockpile, to provide new weapon designs for the stockpile to meet new requirements, to ensure the technical capability to develop new weapons, and to anticipate and assess evolving threats to avoid technological surprise by an adversary. Program activities are performed by the Nevada Operations Office, the Lawrence Livermore National Laboratory, the Los Alamos National Laboratory, the Sandia National Laboratories, and other supporting contractors in the research and development of nuclear weapons. This includes research, development engineering and certification of nuclear warheads required by the Department of Defense for stockpile, investigation of concepts and technologies for future weapons, and advancement of the sciences and technologies applicable to nuclear weapons as well as related research on threat assessment of Nuclear Directed Energy Weapons (NDEW) for both the national Strategic Defense Initiative (SDI) program and for our strategic deterrent forces. Inertial Fusion activities are incorporated into the Weapons Research and Development program because of their contribution to weapons physics understanding in the weapons technology base.

Technology Base activities are the foundation of the program. The technology base consists of the diverse scientific and engineering expertise (people); the basic and applied scientific knowledge; and the specialized equipment, facilities, and data bases which are fundamental for developing atomic energy defense technologies, maintaining nuclear competence, and responding to U.S. security needs in the long term. Programmatically, the technology base is made up of disciplines related to all aspects of nuclear weapons: fission (high explosives, hydrodynamics, and fission physics); fusion (boosting, radiation flow, radiation compression, and fusion burn); and directed/tailored outputs (x-ray, gamma-ray, electromagnetic, laser and plasma). The technology base also includes fundamental research in those scientific and technical disciplines which are a necessary part of the weapons research and development program; i.e., nuclear physics and engineering, atomic physics, shock hydrodynamics, solid state physics, chemistry, materials science, electronics, and mathematics/computer science.

Technology Base activities provide the reservoir of capabilities that are vital to ensure the continued safety, security, and reliability of our present nuclear weapons stockpile, and to support new weapons development engineering and certification efforts. An important part of these activities is directed toward providing scientific innovations, breakthroughs, and technological options to meet future security requirements. Technology base research and development activities are directed toward a number of different areas. An important area is that of weapons safety in which efforts are directed toward reducing the already low probability of accidental dispersal of radioactive materials or of reducing even further the probability of an unauthorized or accidental nuclear yield in existing and future weapons. In the area of weapons control, continuing research and development strives to ensure that the chance of unauthorized use of a nuclear weapon is virtually eliminated.

1. Preface: Weapons Research and Development (cont'd)

Technology Base activities continue to make possible more militarily effective weapons and to develop longer-lived materials and components to reduce stockpile maintenance costs. In addition, planned Technology Base activities respond to Section 1436 of the FY 1989 Defense Authorization Act which requires assurance that a vigorous program of research in areas related to nuclear weapons science and engineering is supported to prepare for further nuclear testing limitations in the future. Efforts are also being directed toward tailoring weapon outputs to provide specialized damage effects for specific targets. Research leading to more efficient weapon configurations and packaging is performed, contributing to the ability to hold at risk such targets as hardened silos and deeply buried installations. Additional research is focused on increasing our understanding of nuclear weapons performance to enhance predictive capability for certain explosive processes and to give greater confidence in the reliability of the Nation's present stockpile. This will also lead to weapons which are less sensitive to small design variations due to production or material changes. Additionally, basic research is conducted to give broad support for related scientific disciplines (such as nuclear and atomic physics, computational sciences, material sciences, chemistry, and engineering) and to avoid technological surprise. Avoidance of technological surprise is especially important considering the likelihood that a nuclear conflict would be short and a long period for mobilization may not be possible. Significant military advantage could accrue to an adversary due to a technological advance of which we are unaware and to which we have no effective response.

Weapons Development Engineering and Certification activities are guided by current national security requirements for providing new strategic and theater nuclear weapons options, for maintaining weapon reliability, and for improving safety and security of all nuclear weapons now in stockpile. Laboratory activities include Phases 1 through 3 directly and support for Phases 4 through 6. Phase 1, conceptual definition, and Phase 2, feasibility studies, are directed, in cooperation with the Department of Defense, toward weapon applications of potential systems to meet the future defense needs. Physics and engineering design, vulnerability, and survivability of the weapon candidates, system analysis of the targets, and overall weapon systems criteria studies are performed. New technological approaches are also explored in order to improve cost effectiveness yet meet the operational, safety, and security requirements. Phase 3, engineering development, includes the detailed physics, engineering design, and testing required to assure that the weapon will perform as expected. Hundreds of components, subassembly, and system tests, both nuclear and non-nuclear, are performed to demonstrate compatibility with the DOD operational environments in the Stockpile-to-Target sequence. Phases 4 through 6, production and stockpile, laboratory efforts are required to facilitate the transition from prototype to production quality components and assemblies manufactured in the DOE weapons plants that meet the design criteria and satisfy certification requirements of the production workload for DOD. The stockpile surveillance and maintenance support activities assure the maintenance of a credible national nuclear deterrent by detecting and evaluating changes that may occur during the stockpile life that may extend for over three decades.

Special Projects include: research and development efforts related to improved hardware, systems, and procedures for the protection of nuclear weapons and strategic quantities of special nuclear material during shipment and storage; the operational costs associated with maintenance of the Department of Energy's Nuclear Emergency Search Team (NEST) capabilities located at Las Vegas, Nevada, and Andrews Air Force Base, Maryland; and other special studies and audits. NEST is the Federal Government's deployment asset to counter a nuclear terrorist threat. These activities, especially those providing protection for nuclear weapons, utilize many of the scientific and technical capabilities employed in the design, development, safety, and security of nuclear weapons. This category also contains the funding for Federal employment at the Los Alamos Area Office in support of the research and development effort.

The Nuclear Directed Energy Weapons (NDEW) research program activities are conducted as part of a nuclear threat assessment for the President's Strategic Defense Initiative and to assess the vulnerability of our current nuclear deterrent. The objectives of this research are (1) to understand the effects of an adversary's possible nuclear directed energy weapons on a U.S. nonnuclear strategic defense system, and (2) to understand the effects of an adversary's possible nuclear directed energy weapons on the U.S. strategic nuclear retaliation system. The scope of the NDEW research effort has been reduced to assessment of three major NDEW concepts. The need for technical feasibility determinations as soon as possible continues because they are required to support SDI nonnuclear architecture decisions.

I. Preface: Weapons Research and Development (cont'd)

Specific technologies being investigated are the x-ray laser, hypervelocity projectiles, and optical frequency laser concepts. Achievement of the feasibility objectives for these concepts would clarify the architecture needed for a strategic defense system by more clearly defining the threat should an adversary develop a nuclear strategic defense. Clarifying the threat will make the architecture more cost effective by avoiding production of systems elements which a nuclear system could counter.

Also included within the Weapons Research and Development program are the new and improved facilities and specialized equipment to maintain and upgrade our research capability; provide for production assurance; comply with environmental, safety, and health laws and requirements; and enhance safeguards and security at the research and development complex.

The near-term objective of inertial fusion research and development is to demonstrate high energy gain (10-100 times energy out compared to energy in) in the laboratory from fusion fuel targets compressed and heated by high energy, high power lasers, or particle beam accelerators. The interaction of these drivers with properly designed inertial fusion targets can result in the high temperature and high density states of matter required for thermonuclear fusion to occur, permitting modeling of weapons physics phenomena and simulation of weapon effects. The capabilities of the nuclear weapons laboratories are supplemented by three support organizations: the University of Rochester Laboratory for Laser Energetics; the Naval Research Laboratory; and a target fabrication support contractor. Major experiments have been carried out at the Nevada Test Site by Lawrence Livermore National Laboratory and by Los Alamos National Laboratory. Major target experiments are conducted on the NOVA glass laser system at the Lawrence Livermore National Laboratory. Beam focusing experiments using light ions are carried out on the Particle Beam Fusion Accelerator II (PBFA II) at the Sandia National Laboratories, Albuquerque. A krypton fluoride laser technology test bed (AURORA) is under development at the Los Alamos National Laboratory.

The Inertial Fusion program conducts experiments and develops high-power laser and particle beam drivers to explore certain physics processes related to nuclear weapons. Currently, the program is an experimental and theoretical effort to determine the feasibility and affordability of a Laboratory Microfusion Facility (LMF), which would advance certain weapons physics simulation and effects capabilities and provide information on high gain target behavior useful in civilian electric power applications. Such a facility, if feasible and affordable, could be built during the mid-to-late 1990's. Classified experiments have been conducted at the Nevada Test Site using the radiation from a nuclear device as the driving energy for the small thermonuclear fuel targets. In late 1988, a group of independent experts determined that recent experiments had answered certain questions about basic feasibility of inertial fusion and that NOVA had made significant progress in producing the appropriate conditions for inertial fusion in the laboratory.

Weapons Research and Development

II. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	% Change
1. R&D Core Program				
a. Technology Base	$ 340,489	$ 347,673	$ 354,113	+ 2%
b. Weapons Development Engineering and Certification	347,197	352,582	369,540	+ 5%
c. Special Projects	69,663	77,233	90,011	+16%
Subtotal, Core - Operating	$ 757,349	$ 777,488	$ 813,664	+ 5%
e. R&D Basic Equipment	$ 56,439	$ 71,287	$ 62,235	-13%
f. R&D Computers	28,400	19,200	29,065	+51%
Subtotal, Core - Capital Equipment	$ 84,839	$ 90,487	$ 91,300	+ 1%
g. General Plant Projects	$ 18,990	$ 19,692	$ 20,000	+ 2%
h. Revitalization	67,152	75,254	92,147	+22%
i. Other Programmatic Construction	22,000	43,340	20,600	-52%
Subtotal, Core - Construction	$ 108,142	$ 138,286	$ 132,747	- 4%
Subtotal, Core Program	$ 950,330	$1,006,261	$1,037,711	+ 3%
2. Nuclear Directed Energy Weapons				
a. Concepts - Operating	$ 109,790	$ 93,696	$ 91,211	- 3%
b. NDEW - Equipment	7,701	5,910	7,300	+24%
c. NDEW - Construction	15,237	18,715	5,000	-73%
Subtotal, NDEW	$ 132,728	$ 118,321	$ 103,511	-13%
3. Inertial Fusion				
a. Gas Laser	$ 34,130	$ 35,798	$ 36,700	+ 2%
b. Glass Laser	94,000	95,506	90,100	- 6%
c. Pulsed Power	25,800	27,376	29,300	+ 7%
d. Supporting Activities	1,600	1,937	1,800	- 7%
Subtotal, Inertial Fusion Operating	$ 155,530	$ 160,617	$ 157,900	- 2%
e. Capital Equipment	$ 7,932	$ 8,609	$ 8,900	+ 3%
f. Construction	0	0	0	--%
Subtotal, Inertial Fusion	$ 163,462	$ 169,226	$ 166,800	- 1%

Weapons Research and Development

II. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	% Change
4. Environment, Safety & Health - Construction	$ 5,400	$ 0	$ 0	--%
5. Safeguards & Security - Construction	$ 15,800	$ 7,880	1,000	-87%
Total, Weapons Research & Development	$1,267,720	$1,301,688	$1,309,022	+ 1%
Summary				
Operating Expenses	$1,022,669	$1,031,801	$1,062,775	+ 3%
Capital Equipment	100,472	105,006	107,500	+ 2%
Construction	144,579	164,801	138,747	-16%
Total R&D	$1,267,720	$1,301,688	$1,309,022	+ 1%

II. B. Major Laboratory and Facility Funding

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Los Alamos National Laboratory	$ 307,872	$ 343,870	$ 325,799	- 5%
Lawrence Livermore National Laboratory	358,507	366,757	364,444	- 1%
Sandia National Laboratories	495,892	497,071	510,970	+ 3%
Nevada Operations Office	39,030	26,889	32,327	+20%

Weapons Research and Development

III. Activity Description

Program Activity	FY 1989	FY 1990	FY 1991
Core Program			
Technology Base	Research activities were conducted to maintain the scientific superiority of the Nation's nuclear deterrence and avoid technological surprise. Developed safe reliable nuclear weapons which fulfilled Department of Defense requirements. Initiated activities to respond to potential further limitations of nuclear test activities as required by Section 1436 of the FY 1989 Defense Authorization Act. Specific activities included: - development of efficient weapons configurations and packaging - development of longer-lived materials and components - development of weapons whose outputs are tailored to specific requirements - development of designs for improved weapon safety - scientific programs to increased the understanding of crucial physics phenomena to support design efforts - exploration of technological options for future military requirements - development of designs and processes for more efficient use of special nuclear materials	FY 1989 program activities will continue although at a somewhat reduced rate. Activities will continue in chemistry and materials science, physics, mathematics, computations, engineering research, and support technologies and advanced concepts. Activities will also continue to advance the state-of-the-art in diagnostics and supplementary laboratory experiments and modeling to support and correlate data from underground testing. Some efforts to increase our computational/ predictive capability will continue. Continue advanced studies to develop AGEX capabilities.	Continue activities in the critical sciences and technologies and operate the facilities needed to conduct the Research, Development, and Test program. Initiate development of AGEX in order to assist in preparation for potential test limitations.

Weapons Research and Development

III. Activity Description

Program Activity	FY 1989	FY 1990	FY 1991
	Initiation of studies to develop an Above Ground Experimental Capability (AGEX) to support potential future nuclear test limitations		
	$ 340,489	$ 347,673	$ 354,113
Weapons Development Engineering and Certification	Conducted stockpile surveillance and maintenance activities to support the present nuclear weapons stockpile. Supported weaponization activities as appropriate for those weapons in Phase 3 and beyond. Phase 3 development activities were supported on the Short Range Attack Missile II (SRAM II) and Nuclear Depth/Strike Bomb (ND/SB). A minimum Phase 3 level of effort was supported on the Small Intercontinental Ballistic Missile (SICBM). Phase 2/2A activities were conducted for the Follow-on to Lance, Short Range Attack Missile-Tactical, and Earth Penetrator Warheads.	Support will continue for stockpile surveillance and maintenance activities to support the present nuclear weapons stockpile. Support for those systems in Phase 3 and beyond will continue. Phase 3 development activities will continue on the SRAM II and ND/SB. Interim Earth Penetrator Weapon (IEPW) programs will enter Phase 3/4, which will run simultaneously. Follow-on to Lance (FOTL) and the Short Range Attack Missile-Tactical (SRAM-T) (also known as TASM) are expected to complete Phase 2A and enter Phase 3. Phases 1, 2, and 2A studies will be supported as appropriate, including the Strategic Relocatable Target Study (SRT), the Strategic Earth Penetrator (SEP), Hypervelocity Glide Vehicle (HGV), Maneuvering	Begin quality initiative for Phase 3 programs which will increase confidence in weapon performance, producibility, and meeting IOC's. Restore stockpile surveillance and maintenance activities to the FY 1989 level of effort. Interim Earth Penetrator Weapon (IEPW) programs will continue in Phase 3/4. Continue support for systems in Phase 3 and beyond. Phase 3 development activities will continue on the SRAM II, ND/SB, FOTL, and SRAM T. Phases 1, 2, and 2A studies will be supported as appropriate including the SRT, SEP, HGV, MARV, and ASW as well as High Power Microwave weapon studies.

III. Activity Description

Program Activity	FY 1989	FY 1990	FY 1991
		Reentry Vehicles (MARV), Anti-submarine Warfare (ASW), and High Power Microwave weapon studies.	
	$ 347,197	$ 352,582	$ 369,540
Special Projects	Supported research and development related to weapons protection and special nuclear materials (SNM) detection. Also, supported the Nuclear Emergency Search Team (NEST), Historically Black Colleges and Universities (HBCU) Program, and special studies and audits.	Continues to support NEST, HBCU, and provides for weapons protection and SNM detection. Includes special projects related to environment safety and health concerns.	Increase needed to conduct an aggressive technology transfer program which was previously funded in the Nuclear Safeguards and Security activity. Provides for remaining activities at about the same level as in FY 1990.
	$ 69,663	$ 77,233	$ 90,011
ADP Leases	Provided for funding of needed ADP items through lease arrangements. Subtotals are indicated as non-add since lease funding is spread among all research and development operating activities.	Provides for needed ADP items to be funded through lease arrangements. Subtotals are indicated as non-add since lease funding is spread among all research and development operating activities.	Provides for needed ADP items to be funded through lease arrangements. Annual lease costs are shown by item below; however, subtotals are indicated as non-add since lease funding is spread among all research and development operating activities. This activity also includes the acquisition of new and innovative computational research computer hardware and/or software which is on the leading edge of technology. These items are subject to short acquisition lead times; and, therefore, it is often not possible to specifically identify each item in the budget. The primary purpose of these items is to allow the evaluation of new

III. Activity Description

Program Activity	FY 1989	FY 1990	FY 1991
			computer hardware and/or software approaches by the Department to determine their potential use in supporting the advanced computational operational requirements of this program. Class VII Computing System, LANL ($5,034) Class VII Computer System, LLNL ($3,390) Data Reduction Replacement, SNL ($100) Supercomputer Mass Storage Upgrade, SNL ($590) Continuation of prior-year authorized leases ($32,548)
Total ADP Leases	($ 23,751)	($ 33,761)	($ 41,662)
TOTAL Core Operating	$ 757,349	$ 777,488	$ 813,664
Laboratory FTE's	4,819	5,948	5,795
R&D Basic Equipment	Procurement limited to the equipment necessary to maintaining the viability of the nuclear weapons complex.	Funding is at a level necessary to support the replacement and addition of equipment critical to meet the requirements of the operating program. Equipment acquired by the laboratories is unique and represents new capability or improved efficiency rather than redundancy.	Provides for the replacement and addition of equipment critical to meet the operating program requirements. This equipment is unique and represents new capability or improved efficiency rather than redundancy. Also, there are two major items of equipment: GLOBAL Positioning Satellite Translation Ground Station, SNL (TEC $3,539) Radio Communication System, LANL (TEC $3,300)
	$ 56,439	$ 71,287	$ 62,235

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Weapons Research and Development

III. Activity Description

Program Activity	FY 1989	FY 1990	FY 1991
R&D Computers	Continued to purchase supercomputers and peripheral equipment to simulate extremely complicated physical processes and optimize design parameters while reducing the number of experiments. Computer simulations were used to enhance the reliability of data obtained from Underground Testing (UGT) and Above Ground Experiments (AGEX). Enabled the continued development of computer codes and mathematical models, needed to develop a predictive capability for both UGT and AGEX performance.	Continue to purchase supercomputers and peripheral equipment to simulate extremely complicated physical processes and optimize design parameters while reducing the number of experiments.	Provides for the following major items of computer equipment: CRAY X-MP/416, LANL ($5,200) CRAY Y-MP/832 Computer System, LLNL ($8,115) Supercomputer Memory Upgrade, SNLL ($1,700) Connection Machine (CM2), LANL ($2,267) Output Station Upgrade, LANL ($1,850) Mass Storage Upgrade, LANL ($3,343) Network Upgrade (4th), LANL ($1,640) Administrative Computer, LANL ($1,950) Supercomputer Mass Storage, SNLA ($3,000)
	$ 28,400	$ 19,200	$ 29,065
GPD-101, General Plant Projects	$ 18,990	$ 19,692	$ 20,000
Revitalization			
90-D-102, Nuclear Weapons RD&T Facilities Revitalization, Phase III, VL			
Weapons Subsystems Laboratory, LANL	$ 0	$ 0	$ 2,000
Site 300 Facilities Revitalization, Phase I, LLNL			
Electric Power Systems Replacement and Upgrade, LLNL	0	985	4,000
Power Distribution System, NTS	0 0	0 0	4,000 1,000

Weapons Research and Development

III. Activity Description

Program Activity	FY 1989	FY 1990	FY 1991
Crane and Drill Rig Certification Building, NTS	0	0	1,700
Reactor Technology Center, SNL	0	0	4,900
New Electric Service, SNL	0	0	2,000
Subtotal, 90-D-102	$ 0	$ 985	$ 19,600
88-D-106, Nuclear Weapons RD&T Facilities Revitalization, Phase II, VL	$ 60,352	$ 74,269	$ 72,547
Other Prior Year Projects	6,800	0	0
Subtotal, Revitalization	$ 67,152	$ 75,254	$ 92,147
Other Programmatic Construction			
88-D-105, Special Nuclear Materials R&D Laboratory Replacement, LANL	$ 22,000	$ 43,340	$ 20,600
Subtotal, Other Programmatic Construction	$ 22,000	$ 43,340	$ 20,600
Subtotal, Core Construction	$ 108,142	$ 138,286	$ 132,747

III. Activity Description

Program Activity	FY 1989	FY 1990	FY 1991
Nuclear Directed Energy Weapons			
Concepts - Operating			
X-Ray Laser	Conducted research to determine the scientific feasibility of the nuclear-driven x-ray laser and its potential as a weapon. As envisioned, this concept will project energy from a nuclear explosive at a much greater distance than is achievable with conventional nuclear weapons. Major efforts included: review of the x-ray laser program and defining experiments. Aboveground laser facilities were used for some experiments; computer modeling and theoretical studies were pursued. New laser materials and system geometries for reductions in beam divergence and increases in laser brightness were evaluated.	Program will continue at a lower level of effort toward achieving objectives due to budget constraints. Lower funding will only allow partial completion of analyses of data from underground tests and laboratory experiments will proceed on a slower schedule. Slowed program will impact progress in establishing research baselines and development of technical specifications. Lower levels of effort than previously planned will be expended on refining laser architectures, experiment planning, and diagnostics design. At the current level of funding, technical feasibility milestone and Block I demonstration (initial threat assessment performance goal) cannot occur soon.	A significantly scaled-back program will continue at a much less than technology-limited pace due to budget constraints. Work will focus on aboveground experimental work, completion of analysis from the last nuclear test, and design of diagnostic capabilities in preparation for the next underground nuclear test Funding limitations will postpone examination of some critical technologies on the next underground test that are necessary for complete system demonstration, as previously planned.
Hypervelocity Projectiles		Continue the program at a slower pace doing aboveground tests using the fast shock tube, light gas gun, and the accelerator. These tests provide data to support analysis of physics research. Specific areas of research focus on shockless plate acceleration, plate break-up mechanisms, and equations-of-state for computer modeling.	Continue a scaled-back program. Use aboveground experimental capabilities and diagnostics including use of available two-dimensional codes to study driver issues and projectile impact effects.

Weapons Research and Development

III. Activity Description

Program Activity	FY 1989	FY 1990	FY 1991
Optical Frequency Lasers	System application efforts were at a low level. The FALCON program proceeded toward a laser demonstration milestone in FY 1991 on an existing reactor. Experimental tests, necessary to perform large-scale/power testing in FY 1992 to FY 1994, were conducted. The CENTAURUS program prepared for an FY 1990 reactor test. The SDI threat assessment feasibility milestone for these concepts may be achievable in the mid-1990's.	Optical frequency laser programs will continue but at a level lower than that in FY 1989. A level of effort lower than the FY 1989 level will continue on the FALCON program. Preparations will be made for a FALCON feasibility demonstration slipped to FY 1991. The CENTAURUS program will be scaled back due to funding shortfalls.	Continuing FALCON efforts will focus on a laser feasibility demonstration (delayed from FY 1990), the evaluation of threats posed by such weapons, and planning for future laser scaling demonstration testing.
Vulnerability, Lethality, and Countermeasures	Continued countermeasure studies, lethality experiments, and modeling efforts to establish NDEW effectiveness. The survivability assessment of U.S. defensive systems (red on blue) is being continued for the three remaining NDEW concepts.	Program emphasis will be on threat assessment of potential adversary NDEW systems. Efforts will be continued to determine the survivability of U.S. SDI architectures and the vulnerability of U.S. deterrent forces to the three remaining NDEW concepts. Program results should be available prior to SDI architecture decisions planned for mid 1990's.	Continue studies to understand and model the phenomenology of the weapon effects for the NDEW concepts in order to help evaluate the impact on U.S. systems or their potential utility for the U.S. Complete code benchmarking of microparticle experiments. Begin experiments with HE simulators. Design next underground test add-on laser effects experiment.

Weapons Research and Development

III. Activity Description

Program Activity	FY 1989	FY 1990	FY 1991
Systems Analysis	Continued utility assessments of the potential NDEW systems based on perceived Soviet objectives and responses, and on Soviet technical, operational, and policy restrictions. Analysis focused on Red-Blue interaction as recommended by Strategic Defense Research Technical Review.	Systems analysis will integrate intelligence and R&D efforts to produce likely scenarios for impact of possible Soviet systems on U.S. SDI and strategic deterrence forces.	Systems analysis work will continue to assess the likelihood of the development of a Soviet NDEW and programmatic impact on our strategic forces. The evaluation of mission utility for evolving SDI applications will be completed for non-SDI missions.
Total Concepts - Operating	$ 109,790	$ 95,696	$ 91,211
Laboratory FTE's	1,035	784	758
NDEW - Equipment	To support the operating expense program, accompanying purchases of capital equipment were required for diagnostics and calibration activities, and also for fabrication, characterization, and inspection of materials of importance to strategic defense research. Although the initial application is related to strategic defense research, most of the equipment is sufficiently generic to support other laboratory research programs.	Continues to provide capital equipment in support of the operating program.	Continues to provide for capital equipment in support of the operating program.
NDEW - Equipment	$ 7,701	$ 5,910	$ 7,300

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Weapons Research and Development

III. Activity Description

Program Activity	FY 1989	FY 1990	FY 1991
RDEV - Construction			
88-D-106, Nuclear Weapons RD&T Facilities Revitalization, Phase II, VI. Nuclear Directed Energy Research Facility, LLNL	$ 12,000	$ 18,715	$ 5,000
Prior-Years Projects	3,237	0	0
Total, Nuclear Directed Energy Weapons Construction	$ 15,237	$ 18,715	$ 5,000
Inertial Fusion			
Gas Laser	Funded gas laser approach at Los Alamos National Laboratory (LANL) at the level required to meet KrF laser system milestones, thus providing full KrF technology demonstration. NRL began developing a laser to assist LANL in developing KrF technology, particularly by exploring the direct drive approach with KrF. Continued development of target design and performed target experiments at 1 KJ on AURORA. Fabricated targets for the AURORA laser and for inertial fusion experiments at other laboratories. Continued efforts on CENTURION.	Emphasis will be placed on KrF laser development in order to assess this technology as a viable candidate for the Laboratory Microfusion Facility (LMF) assessment scheduled for the mid-1990's time frame. Target experiments at 3-5 KJ will be conducted on AURORA. NRL will continue KrF development efforts. Target design and development will continue with emphasis on targets for AURORA and PBFA II. Preparation for the next Centurion experiment will be terminated.	KrF laser development activities will continue in support of the driver decision milestone for the Laboratory Microfusion Facility (LMF). Development of target design and experimentation on Aurora and PBFA-II will continue. NRL will continue KrF laser development effort.
	$ 34,130	$ 35,798	$ 36,700

Weapons Research and Development

III. Activity Description

Program Activity	FY 1989	FY 1990	FY 1991
Glass Laser	Completed replacement of NOVA glass to improve NOVA laser performance from 20 kj to 120 kj output at one micron wavelength. Continued NOVA experimental program to increase understanding of how to create the rigorous physical conditions required for ICF implosions in the laboratory using small targets filled with deuterium and tritium. Began NOVA compression experiments with pulse shaping, studying laser-plasma instabilities, laser/target energy coupling, and high density implosion physics. Supported LMF target performance modelling, design, development, and fabrication. Continued to develop advanced glass laser materials, technology and manufacturing techniques as a basis for a glass laser LMF. Continued OMEGA direct-drive experiments, and laser-matter interaction physics studies with cryogenic capsules. OMEGA experiments provided critical data on the implosion behavior of directly driven targets. Completed engineering and development studies for the upgrade of OMEGA.	Continue efforts contributing toward a Glass Laser Laboratory Microfusion Facility (LMF). Continue NOVA experimental program at a reduced level. Continue improvements to NOVA to achieve precise energy beam balance, advanced diagnostics, and pulse shaping ("Precision NOVA") to permit higher gain at lower drive energy. Continue development of glass laser technology at reduced level. Continue OMEGA direct drive experiments at a reduced level. This funding level will not permit upgrade of OMEGA laser at the University of Rochester. Funding no longer included for Pharos III Glass Laser experiments at NRL.	Continue efforts to develop a glass laser driver as a candidate for an LMF. Continue NOVA experimental program at a level somewhat below the FY 1990 level of effort. Continue effort to achieve "Precision NOVA," and glass laser technology development. Increase OMEGA direct drive cryogenic experimental activities to the FY 1989 level of effort. Funding no longer provided for operation of Chroma Laser at KMS Fusion.
	$ 94,000	$ 95,506	$ 90,100

Weapons Research and Development

III. Activity Description

Program Activity	FY 1989	FY 1990	FY 1991
Pulsed Power	Conducted initial ion beam target experiments (non-implosion) which are necessary to understand the behavior of the properties of ion beams as a prerequisite to implosion experiments. Continued PBFA II experimental program and ion source development effort to validate pulsed power light-ion beams on an inertial fusion driver.	Conduct ion beam target experiments (non-implosion). Increase PBFA II experimental program and ion source development effort to validate pulsed power light-ion beams as an inertial fusion driver for the Laboratory Microfusion Facility (LMF).	Continue ion beam target experiments and conduct initial implosion experiments on PBFA II. Conduct positive polarity power flow experiments on Hermes III in support of driver decision milestone for Laboratory Microfusion Facility (LMF).
	$ 25,800	$ 27,376	$ 29,300
Supporting Activities	Provided essential systems and consultant services to assist attainment of program objectives. Supported Congressionally mandated review of the Inertial Fusion Program. Provided support for Laboratory Microfusion Capability Study and Inertial Fusion Independent Consultants. Provided grants to university and other researchers to conduct experiments at the National Laser Users Facility (NLUF).	Provide essential systems and applications studies and consultant services to assist attainment of program objectives. Provide support for Laboratory Microfusion Capability Study and Inertial Fusion Independent Consultants. Provide grants to university and other researchers to conduct experiments at the National Laser Users Facility (NLUF).	Restore the FY 1989 level effort to provide essential systems and applications studies and consultant services to assist attainment of program objectives. Also, provide support for Laboratory Microfusion Capability Study and Inertial Fusion Independent Consultants and provide grants to university and other researchers to conduct experiments at the National Laser Users Facility (NLUF).
	$ 1,600	$ 1,937	$ 1,800
Total Inertial Fusion Operating	$ 155,530	$ 160,617	$ 157,900
Laboratory FTE's	1,041	1,049	1,013

Weapons Research and Development

III. Activity Description

Program Activity	FY 1989	FY 1990	FY 1991
Capital Equipment	Procured minimum equipment required to support reduced experimental program.	Maintain level of effort in providing capital equipment procurement to support driver and target development and laser experimental program.	Continues level of effort in providing capital equipment procurement to support driver and target development and laser experimental program.
	$ 7,932	$ 8,609	$ 8,900
TOTAL, Inertial Fusion	$ 163,442	$ 169,226	$ 146,800
Environment, Safety, and Health Construction			
88-D-103, Seismic Upgrade Building 111, LLNL	5,400	0	0
Total ES&H Construction	$ 5,400	$ 0	$ 0
Safeguards and Security Construction			
88-D-104, Safeguards and Security Upgrade, Phase II, LANL	$ 7,300	$ 985	$ 1,000
87-D-104, Safeguards and Security Enhancement, Phase II, LLNL	8,500	6,895	0
Total Safeguards and Security Construction	$ 15,800	$ 7,880	$ 1,000
TOTAL R&D	$1,267,720	$1,301,688	$1,309,022
R&D Summary			
Operating	$1,022,669	$1,031,801	$1,062,775
Capital Equipment	100,472	105,006	107,500
Construction	144,579	164,881	138,747
Total R&D	$1,267,720	$1,301,688	$1,309,022

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KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Weapons Research and Development

IV. A. Construction Project Summary

Project Number	Project Title	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Unappropriated Balance	TEC
Weapons Systems Construction						
GPD-101	General Plant Projects, VL	$ 0	$ 0	$ 20,000	$ 0	$ 20,000
90-D-101	General Plant Projects, VL	0	19,692			19,692
	Subtotal, General Plant Projects	$ 0	$ 19,692	$ 20,000	$ 0	
Revitalization						
90-D-102	Nuclear Weapons Research, Development, and Testing Facilities Revitalization, Phase III, VL	$ 0	$ 985	$ 19,600	$ 148,195	$ 168,780
88-D-106	Nuclear Weapons Research, Development, and Testing Facilities Revitalization, Phase II, VL	$ 82,314	$ 74,269	$ 72,547	$ 39,990	$ 269,120
	Subtotal, Revitalization	$ 82,314	$ 75,254	$ 92,147	$ 188,185	
Other Programmatic Construction						
88-D-105	Special Nuclear Materials R&D Laboratory Replacement, Los Alamos National Laboratory, Los Alamos, NM	$ 32,000	$ 43,340	$ 20,600	TBD	TBD
	Subtotal, Other Programmatic Construction	$ 32,000	$ 43,340	$ 20,600	TBD	

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KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Weapons Research and Development

IV. A. Construction Project Summary

Project Number	Project Title	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Unappropriated Balance	TEC
WDEV Construction						
88-D-106	Nuclear Weapons Research, Development, and Testing Facilities Revitalization, Phase II, VI	$ 19,000	$ 18,715	$ 5,000	$ 19,785	$ 62,500
	Subtotal, WDEV - Construction	$ 19,000	$ 18,715	$ 5,000	$ 19,785	
Safeguards and Security						
88-D-104	Safeguards and Security Upgrade, Phase II Los Alamos National Laboratory, Los Alamos, NM	$ 10,800	$ 985	$ 1,000	$ 2,515	$ 15,300
87-D-104	Safeguards and Security Enhancement II, Lawrence Livermore National Laboratory, Livermore, CA	17,468	6,095	0 a/	5,037	29,400
	Subtotal, Safeguards and Security	$ 28,268	$ 7,080	$ 1,000	$ 7,552	
	Total, Research and Development Construction	$ 161,582	$ 166,881	$ 138,747	$ 215,522 b/	

a/ Operating funds will be used in FY 1991 and FY 1992 to make offsite road improvements to Vasco Road made necessary by this project. For details on these improvements, see Section 13 of the Construction Project Data Sheet.

b/ This total does not include any funding for Project 88-D-105, Special Nuclear Materials R&D Laboratory, Los Alamos, New Mexico, beyond FY 1991. The cost, schedule, and scope of the project are under review.

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Research, Development, and Testing

IV. B. Plant Funded Construction Project

1. Project GPD-101, General Plant Projects
Various Locations

PROJECT TEC: $27,100
START DATE: 1st Qtr. FY 1991
COMPLETION DATE: 4th Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 27,100	$ 27,100	$ 8,130
1992	0	0	10,840
1993	0	0	8,130

3. Narrative:

This project provides for general plant improvements such as construction or modification of roads, utilities, minor structures, and technical facilities required in the operation of the weapons research and development facilities and the nuclear weapons testing facilities. Requirements for small projects of this type cannot be fully detailed 2 years in advance of the need.

Funding for general plant projects is necessary to meet new and changing program developments, to correct deficiencies, and for minor utility and road construction.

The requested FY 1991 funding will be used for design and construction of small projects of the types identified in the data sheet.

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 8,130	$ 18,970
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Research and Development

IV. B. Plant Funded Construction Project

1. Project 90-D-102, Nuclear Weapons Research, Development, and Testing Facilities Revitalization, Phase III, Various Locations

PROJECT TEC: $168,780
START DATE: 1st Qtr. FY 1990
COMPLETION DATE: 4th Qtr. FY 1995

2. Financial Schedule

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 985	$ 985	$ 800
1991	19,600	19,600	14,700
1992	63,020	63,020	50,000
1993	46,015	46,015	51,000
1994	22,860	22,860	33,220
1995	16,300	16,300	19,060

3. Narrative:

This project is a continuation of revitalization beginning in 1984. The equipment and facilities included in this project are essential to replace or add to the existing facilities to maintain the facilities and meet the needs of the growing complexity of nuclear research, development, and testing.

The following is a list of subprojects:

1. Site 300 Upgrade, LLNL
2. Electrical System Replacement and Upgrade, LLNL
3. Electrical System Upgrade, SNL
4. Power Distribution System, NTS
5. Weapons Subsystems Laboratory, LANL
6. Reactor Technology Center, SNL
7. Crane and Drill Rig Certification Building, NTS

The FY 1991 funding will be used to initiate engineering on all subprojects with some subprojects entering the procurement and construction phases.

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Research and Development

IV. B. Plant Funded Construction Project

1. Project 90-D-102, Nuclear Weapons Research, Development, and Testing Facilities Revitalization, Phase III, Various Locations

PROJECT TEC: $168,780
START DATE: 1st Qtr. FY 1990
COMPLETION DATE: 4th Qtr. FY 1995

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 800	$14,700	$153,280
Capital Equipment	0	0	0	0	0
Operating Expenses	$ 0	0	1,850	0	0

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FEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Research and Development

IV. B. Plant Funded Construction Project

1. Project 88-D-104, Safeguards and Security Upgrade, Phase II,
Los Alamos National Laboratory, Los Alamos, New Mexico

PROJECT TEC: $15,300
START DATE: 3rd Qtr. FY 1988
COMPLETION DATE: 3rd Qtr. FY 1992

2. Financial Schedule

Fiscal Year	Appropriation	Obligations	Costs
1988	$ 3,500	$ 3,500	$ 308
1989	7,300	7,300	3,552
1990	985	985	4,500
1991	1,000	1,000	4,000
1992	2,515	2,515	2,940

3. Narrative:

This project will provide for four major categories of safeguards and security upgrades: (a) emergency perimeter fencing at the main technical area, Technical Area 3; (b) physical security in various technical areas; (c) special nuclear materials monitoring and accountability equipment; and (d) substantial equipment upgrade of the integrated computing network.

Phase II of the safeguards and security upgrade project will provide for the continuation of significant improvements to the security of special nuclear materials and classified information of the Los Alamos National Laboratory. This project encompasses the establishment of additional safeguards in areas where special nuclear materials are processed, transported, used, or stored. The requested safeguards will provide for better (a) detection and neutralization of unauthorized entries, (b) countermeasures against attempts of removal, (c) detection of small losses of special nuclear materials that could be used for embarrassing actions in vulnerable areas, and (d) physical protection of sensitive areas.

FY 1991 funding is required to continue construction and procurement activities.

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Research and Development

IV. B. Plant Funded Construction Project

1. Project 88-D-104, Safeguards and Security Upgrade, Phase II,
Los Alamos National Laboratory, Los Alamos, New Mexico

PROJECT TEC: $15,300
START DATE: 3rd Qtr. FY 1988
COMPLETION DATE: 3rd Qtr. FY 1992

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 308	$ 3,552	$ 4,500	$ 4,000	$ 2,940
Capital Equipment	0	0	0	0	0
Operating Expenses	$ 120	0	0	0	0

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ATOMIC ENERGY DEFENSE ACTIVITIES
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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Research and Development

IV. B. Plant Funded Construction Project

1. Project 88-D-105, Special Nuclear Materials R&D Laboratory Replacement, Los Alamos National Laboratory, Los Alamos, New Mexico

PROJECT TEC: TBD a/
START DATE: 3rd Qtr. FY 1988
COMPLETION DATE: 1st Qtr. FY 1997 a/

2. Financial Schedule

Fiscal Year	Appropriation	Obligations	Costs
1988	$ 10,000	$10,000	$ 4,621
1989	22,000	22,000	12,351
1990	43,340	25,100	25,400
1991	20,600	20,600	20,800
1992	TBD	TBD	TBD
1993	TBD	TBD	TBD
1994	TBD	TBD	TBD
1995	TBD	TBD	TBD

3. Narrative:

The Special Nuclear Materials Research and Development (SNM R&D) Facility project consists of a 115,000-square foot Laboratory Building, a 50,000-square foot Cold Support and Office Building, a 10,000-square foot Utility Building, a waste pretreatment facility, a protected area access portal, and provides for decontamination and partial conversion/refurbishment of the Chemistry and Metallurgy Research (CMR) Building. These facilities replace aging laboratories that are essential to maintaining the laboratory's plutonium processing operations and the overall weapons program. Without these new and refurbished facilities, continued long-term reliable, safe, and secure operations of critical chemistry and metallurgy R&D services cannot be ensured.

Corroded and breached air handling ducts, inadequate supply of filtered air, marginal building-wide filter systems, and inadequate control systems contribute to serious situations developing in the CMR Building. A system failure would adversely affect safety of personnel and require shutting down the facility. In this event, operations at the Plutonium Facility would cease, and the Laboratory could not meet its test program objectives.

a/ The cost, schedule, and scope of this project are under review.

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

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Weapons Research and Development

IV. B. Plant Funded Construction Project

1. Project 88-D-105, Special Nuclear Materials R&D Laboratory Replacement, Los Alamos National Laboratory, Los Alamos, New Mexico

PROJECT TEC: TBD a/
START DATE: 3rd Qtr. FY 1988
COMPLETION DATE: 1st Qtr. FY 1997

3. Narrative (cont'd)

The following is a list of subprojects:

1. Special Nuclear Materials Research and Development Laboratory, LANL.

2. Decontamination and Refurbishment of Chemistry and Metallurgy Research Building, LANL.

In FY 1991, funds will be used to continue design. Project completion will occur in FY 1997 at the earliest--8 years in the future. The safety risk of continued operation of the present facility could become unacceptable. Delaying funding will increase this likelihood and jeopardize the Laboratory's ability to meet its programmatic commitments.

The CMR building is overcommitted at 150 percent planned capacity, with laboratories located in basement storage areas. Glove boxes are corroded and require replacement. Many areas in the building are radiologically contaminated. In short, the CMR building is nearing the end of its useful life.

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 4,621	$12,351	$25,400	$20,800	TBD
Capital Equipment	0	0	0	0	0
Operating Expenses	$ 2,750	0	0	0	0

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Research and Development

IV. B. Plant Funded Construction Project

1. Project 88-D-106, Nuclear Weapons Research, Development, and Testing Facilities Revitalization, Phase II, Various Locations

PROJECT TEC: $331,620
START DATE: 1st Qtr. FY 1988
COMPLETION DATE: 3rd Qtr. FY 1994

2. Financial Schedule

Fiscal Year	Appropriation	Obligations	Costs
1988	$ 28,962	$28,960	$ 5,181
1989	72,352	72,352	16,254
1990	92,984	92,984	75,290
1991	77,547	77,547	85,240
1992	46,015	46,017	103,987
1993	13,760	13,760	45,668

3. Narrative

This project is the third phase of an initiative started in FY 1984 which provides for the construction of new facilities and modifications, relocations, and additions to existing facilities for the nuclear weapons research, development, and testing complex. These new and modified facilities will replace or add to existing facilities that are overaged, deteriorated, overcrowded, or are inadequate to meet the capabilities required for the RD&T program. Following is a list of subprojects:

1. Dormitories, NTS ($5,450)
2. High Intensity Source Laboratory, NLV ($2,130)
3. Construction Facilities Replacement--Area 6, NTS ($21,700)
4. Advanced Technology Laboratory, NLV ($3,840)
5. Dual-Axis Radiographic Hydrotest Facility, LANL ($53,400)

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Research and Development

IV. B. Plant Funded Construction Project

1. Project 88-D-106, Nuclear Weapons Research, Development, and Testing Facilities Revitalization, Phase II, Various Locations

PROJECT TEC: $331,620
START DATE: 1st Qtr. FY 1988
COMPLETION DATE: 3rd Qtr. FY 1994

3. Narrative (cont'd)

6. Materials Science Laboratory, LANL ($29,300)
7. Defense Engineering Laboratory, SNLL ($45,600)
8. Integrated Materials Research Laboratory, SNLA ($27,900)
9. Nuclear Directed Energy Research Facility, LLNL ($62,500)
10. Nuclear Test Technology Complex, LLNL ($52,000)
11. Explosive Components Facility, SNL ($27,800)

The purpose of this project is to revitalize the RD&T complex and correct a decade of minimal construction funding which has resulted in a stagnation and, in some cases, an erosion in the capabilities for the weapons RD&T capital asset base.

FY 1991 funding will be used to continue construction and procurement of subprojects initiated in FY 1988 and FY 1989.

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 5,181	$16,254	$75,290	$85,240	$149,655
Capital Equipment	0	0	0	0	0
Operating Expenses	$ 1,581	0	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Research and Development

IV. B. Plant Funded Construction Project

1. Project 87-D-104, Safeguards and Security Enhancement II,
Lawrence Livermore National Laboratory,
Livermore, California

PROJECT TEC: $ 29,400
START DATE: 1st. Qtr. FY 1987
COMPLETION DATE: 4th Qtr. FY 1992

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1987	$ 1,968	$ 1,968	$ 312
1988	7,000	7,000	2,318
1989	8,500	8,500	4,370
1990	6,895	6,895	7,900
1991	0 a/	0	6,500
1992	5,037	5,037	8,000

3. Narrative:

This project at the Lawrence Livermore National Laboratory will provide two physical protection systems: (1) a "Super Block" security area surrounding the Tritium Facility, the Plutonium Facility, the Laser Isotope Facility, and the Engineering Test Building with intrusion detection, hardened guard stations, and access portals; and (2) a "Layered Security System" around the "Super Block" to include fences, roads, portals, badge offices, safeguards and security training and housing facilities, shipping and receiving improvements, security barriers, and utilities. Also, within the "Super Block" subproject are new special nuclear materials vaults, radiographic and Special Nuclear Materials laboratories, office space additions to replace modular trailers, and a secondary alarm system.

The purpose of this project is to provide for upgrading/enhancement of physical protection at LLNL as required to meet current Department of Energy threat guidance. This project will implement the use of a layered security system which places the most stringent access controls on the highest risk targets and offers a reasonable interface between low-risk targets and the public. The "Super Block" concentrates the highest risk activities within one tightly controlled area. The "Layered Security System" then provides the layered intrusion, threat assessment, and response capability around the "Super Block." Both aspects are necessary to implement fully the layered system required to mitigate threats to materials, property, and personnel.

a/ Operating funds will be used in FY 1991 and FY 1992 to make offsite road improvements to Vasco Road made necessary by this project. For details on these improvements, see Section 13 of the Construction Project Data Sheet.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Research and Development

IV. B. Plant Funded Construction Project

1. Project 87-D-104, Safeguards and Security Enhancement II,
Lawrence Livermore National Laboratory,
Livermore, California

PROJECT TEC: $ 29,400
START DATE: 1st. Qtr. FY 1987
COMPLETION DATE: 4th Qtr. FY 1992

3. Narrative (cont'd)

FY 1991 funding will be used to continue the "Super Block" and the "Layered Security System" design/construction/procurement activities initiated in prior years.

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$2,630	$ 4,370	$ 7,900	$ 6,500	$ 8,000
Capital Equipment	0	0	0	0	0
Operating Expenses	$ 500	0	0	1,150	1,150

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

LEAD TABLE

Weapons Testing

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
Core Program						
Operating	$ 409,150 a/	$ 410,894 f/	$ 410,894	$ 442,268	$ +31,374	+ 8%
Capital Equipment	36,733 b/	39,286 g/	39,286	33,550	-5,736	-15%
Construction	6,014 c/	6,550 h/	6,550	7,100	+ 550	+ 8%
Subtotal	$ 451,897	$ 456,730	$ 456,730	$ 482,918	$ +26,188	+ 6%
Nuclear Directed Energy Weapons						
Operating	$ 98,464 d/	$ 88,220 i/	$ 88,220	$ 84,443	$ -3,777	- 4%
Capital Equipment	9,153 e/	7,880 i/	7,880	3,950	-3,930	-50%
Subtotal	$ 107,617	$ 96,100	$ 96,100	$ 88,393	$ -7,707	- 8%
Safeguards and Security - Construction	$ 12,200	$ 9,318 h/	$ 9,318	$ 4,242	-5,076	-54%
Total Testing	$ 571,714	$ 562,148	$ 562,148	$ 575,553	$ +13,405	+2%
Summary						
Operating Expenses	$ 507,614	$ 499,114	$ 499,114	$ 526,711	+27,597	+ 6%
Capital Equipment	45,886	47,166	47,166	37,500	-9,666	-20%
Construction	18,214	15,868	15,868	11,342	-4,526	-29%
Total Testing	$ 571,714	$ 562,148	$ 562,148	$ 575,553	$ +13,405	+ 2%
Staffing FTE's	116	116	116	116		

Footnotes for Testing Lead Table

a/ FY 1989 Appropriation - $410,000,000. Reflects transfer of $850,000 to the Office of Environmental Restoration and Waste Management.
b/ FY 1989 Appropriation - $38,161,000. $1,428,000 reprogrammed for Defense Waste and Materials Production activities.
c/ FY 1989 Appropriation - $7,000,000. Reflects transfer of $986,000 to the Office of Environmental Restoration and Waste Management.
d/ FY 1989 Appropriation - $108,464,000. $10,000,000 reprogrammed for Defense Waste and Materials Production activities.
e/ FY 1989 Appropriation - $9,509,000. $356,000 reprogrammed for Defense Waste and Materials Production activities.
f/ FY 1990 Appropriation - $421,700,000. Reflects transfer of $4,480,000 to the Office of Environmental Restoration and Waste Management. Reflects sequestration of $6,326,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177).
g/ FY 1990 Appropriation - $40,420,000. Reflects transfer of $528,000 to the Office of Environmental Restoration and Waste Management. Reflects sequestration of $606,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177).
h/ FY 1990 Appropriation - $7,400,000. Reflects transfer of $739,000 to the Office of Environmental Restoration and Waste Management. Reflects sequestration of $111,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177).
i/ FY 1990 Appropriation - $90,000,000. Reflects transfer of $430,000 to the Office of Environmental Restoration and Waste Management. Reflects sequestration of $1,350,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177).
j/ FY 1990 Appropriation - $8,000,000. Reflects sequestration of $120,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177).
k/ FY 1990 Appropriation - $9,460,000. Reflects sequestration of $142,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177).

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

SUMMARY OF CHANGES

Weapons Testing

FY 1990 Appropriation	$ 562,148
Adjustments	0
FY 1991 Base	$ 562,148
Testing Core Program	
· Increase to reflect the Administration's inflation projection for all operating expenses	+17,258
· Supports planned test schedule mix, core test planned vice NDEV test	+14,116
· Reduces funding for capital equipment asset base and increases funding for general plant projects	-5,186
Nuclear Directed Energy Weapons	
· Reduces funding for operating expenses	-3,777
· Reduces capital equipment necessary to support the testing activities	-3,930
Safeguards and Security Construction	
· Completes construction on Project 85-D-105, Combined Device Assembly Facility, NTS, Nevada	-5,076
FY 1991 Congressional Budget Request	$ 575,553

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

WEAPONS ACTIVITIES

I. Preface: Weapons Testing

Underground nuclear testing is an integral part of the overall weapons research and development effort. Understanding the complex processes by which nuclear energy is released in a nuclear explosive is critical to understanding and improving nuclear weapon performance and can only be produced in a nuclear test. As a result, nuclear testing represents the highest priority experimental program of nuclear weapons research and development. Nuclear tests are conducted to fulfill a number of basic objectives. Principal among those are:

- To evaluate and maintain confidence in the performance of stockpile weapons that form the basis of our national policy of nuclear deterrence.
- To develop safe, secure, and effective weapons for new military weapon systems needed to counter the changing Soviet threat, thus maintaining our deterrent into the future.
- To ensure survivability of weapons and other military assets, including command, control, communication, and intelligence systems exposed to a hostile nuclear environment.
- To avoid technological surprise by exploring new weapon concepts which could constitute potential new Soviet threats or could provide significant enhancement to our own deterrent.
- To improve our ability to understand and predict the behavior of nuclear weapon systems to permit changes or improvements in nuclear design that might be needed for future deterrence, should additional restrictions be placed on nuclear testing.

Several well-coordinated activities are required before nuclear tests can be conducted in a safe and efficient manner. In many cases, an experimental nuclear device needs to be designed and fabricated. In all cases, an array of diagnostic instruments and detectors must be designed and fabricated to measure weapon performance to provide the weapon designer with sufficient information to understand what has transpired in the test. All of these components are engineered into a relatively compact experimental package which is deeply emplaced underground in such a way that the energy and radioactive debris from the explosion is safely contained underground.

The Technology Base portion of the nuclear testing program supports research and development efforts to improve our understanding of the physical processes relevant to nuclear weapon design. Experiments in this category often are specially designed to isolate critical factors that can affect weapon performance. Tests to explore the feasibility of new nuclear designs that might be needed for new Department of Defense weapon systems for deterrence in the future are also included in this category. If additional restrictions are placed on nuclear testing, greater reliance will have to be placed on our basic understanding of the physics of nuclear weapons that can be developed with tests in this category.

The Weapons Development Engineering and Certification (WDEC) portion of nuclear testing supports work on the current stockpile and near-term improvements to the stockpile. When an experimental device is chosen for use in a new stockpile weapon system, nuclear tests are generally needed to assure that engineering features are incorporated into the device to make it a militarily useful, safe, and survivable weapon. In certain of these tests in this category, a weapon or major weapon components are returned from the stockpile and detonated to assure that any change introduced in the production process and/or effects of the stockpile environment, e.g., aging, have not adversely affected device performance over time.

I. Preface: Weapons Testing (cont'd)

The Testing Capabilities category encompasses those activities necessary to maintain and enhance our national capability to conduct full-scale underground nuclear tests (within the 150 kiloton limit) at the Nevada Test Site (NTS) and to conduct nonnuclear tests and field experiments elsewhere in support of NTS activities. Included in this category are efforts directed toward (1) improving the efficiency of nuclear testing through improved engineering techniques and the use of advanced technology, (2) improving containment practices and techniques to assure that tests are conducted in a safe and environmentally acceptable manner, (3) maintenance of the NTS, (4) providing the necessary logistical support to the technical organizations participating in test activities, and (5) preparing for future test activities to meet anticipated national security needs.

The Nuclear Directed Energy Weapons (NDEW) portion of nuclear testing supports research to explore the feasibility of NDEW concepts in support of nuclear threat assessment: i.e., x-ray laser, hypervelocity projectiles, and optical frequency lasers. Because they investigate the behavior of complicated devices and phenomena different from those previously experienced in the traditional nuclear weapons program, these tests tend to be extremely complex and require new diagnostic instrumentation techniques. The FY 1991 test schedule is structured in coordination with the NDEW research and development activity which will support threat assessment for the U.S. strategic forces, both deterrent and future defense, by enhancing physical understanding of what might be possible for these concepts, leading to determinations on technical feasibility of the concepts. These determinations could have large impacts on the future character and vulnerability of our nuclear stockpile on future strategic defense systems.

The Marshall Islands Program category includes costs incurred in carrying out the Department's obligations to conduct environmental studies of those Marshall Islands contaminated by atmospheric testing prior to the Limited Test Ban Treaty (LTBT) and to provide medical surveillance of the people of Rongelap and Utrik and medical care to those actually exposed. This category does not support any nuclear underground testing.

Weapons Testing

II. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	% Change
1. Testing Core Program				
a. Technology Base	$ 134,650	$ 127,544	$ 151,328	+19%
b. Weapons Development Engineering and Certification	94,364	95,372	98,935	+ 4%
c. Testing Capabilities	175,286	182,659	187,025	+ 2%
d. Marshall Islands	4,850	5,319	4,980	- 6%
Subtotal, Test Core - Operating	$ 409,150	$ 410,894	$ 442,268	+ 8%
e. Testing Basic Equipment	$ 36,733	$ 39,286	$ 33,550	-15%
f. Testing Computers	0	0	0	--%
Subtotal, Core Capital Equipment	$ 36,733	$ 39,286	$ 33,550	-15%
g. General Plant Projects	$ 6,014	$ 6,550	$ 7,100	+ 8%
Subtotal, Core Construction	$ 6,014	$ 6,550	7,100	+ 8%
Subtotal, Testing Core Program	$ 451,897	$ 456,730	$ 482,918	+ 6%
2. Nuclear Directed Energy Weapons				
a. Concepts - Operating	$ 98,464	$ 88,220	$ 84,443	- 4%
b. NDEV - Equipment	9,153	7,800	3,950	-50%
Subtotal, NDEV	$ 107,617	$ 96,100	$ 88,393	- 8%
3. Safeguards & Security - Construction	$ 12,200	$ 9,318	$ 4,242	-54%
Total, Weapons Testing	$ 571,714	$ 562,148	$ 575,553	+ 2%

II. B. Major Laboratory and Facility Funding

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Los Alamos National Laboratory	$ 73,698	$ 70,675	$ 72,800	+ 3%
Lawrence Livermore National Laboratory	83,212	79,190	80,856	+ 2%
Sandia National Laboratories	55,229	53,198	57,055	+ 7%
Nevada Operations Office	359,575	359,085	364,842	+ 2%

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Weapons Testing

III. Activity Description

Program Activity	FY 1989	FY 1990	FY 1991
Core Program			
Technology Base	$ 134,650	$ 127,544	$ 151,328
Weapons Development Engineering and Certification	$ 94,364	$ 95,372	$ 98,935
Testing Capabilities	Supported the test program including test diagnostics, containment, and weapons phenomenology. Also supported maintenance of the Nevada Test Site (NTS) for use in addressing national security needs.	Continuation of activities supporting the test program and maintaining the NTS for use in addressing national security needs.	Supports activities to continue the FY 1990 test level schedule.
	$ 175,286	$ 182,659	$ 187,025
Marshall Islands	Supported the health and environmental monitoring studies of the Marshallese people.	Support will continue for the health and environmental monitoring studies of the Marshallese people.	Continue to study the long-term effects of nuclear testing on the Marshallese people by conducting medical followup of those persons subjected to fallout and environmental surveillance of affected areas.
	$ 4,850	$ 5,319	$ 4,980
Total Test Core - Operating	$ 409,150	$ 410,894	$ 442,268

Weapons Testing

III. Activity Description

Program Activity	FY 1989	FY 1990	FY 1991
Testing Basic Equipment	Testing requirements change and intensify as new weapons and/or weapons components are developed. Designs must be tested with advanced diagnostics both in special laboratory simulated tests and in underground tests. Provided funding necessary to support these testing activities.	Continues support of the testing activities.	Continues to provide funding necessary to support testing activities.
Subtotal, Capital Equipment	$ 36,733	$ 39,286	$ 33,550
GPD-101, General Plant Projects, VL	$ 6,014	$ 6,550	$ 7,100
Subtotal, Construction	$ 6,014	$ 6,550	$ 7,100
Subtotal, Core Program	$ 451,897	$ 456,730	$ 482,918
Laboratory FTE's	1,427	1,312	1,296
Nuclear Directed Energy Weapons			
Concepts-Operating	$ 98,464	$ 88,220	$ 84,443
Laboratory FTE's	471	329	333
MDEW - Capital Equipment	To support the operating expense program, accompanying purchases of capital equipment were required for diagnostics and calibration activities, and also for fabrication, characterization, and inspection of materials of importance to strategic defense research. Although the initial application was related to strategic defense research, most of the equipment	Continues the FY 1989 level of effort.	Continues to provide for equipment purchases in support of the operating expense program.

III. Activity Description

Program Activity	FY 1989	FY 1990	FY 1991
	is sufficiently generic to support other laboratory research programs.		
	$ 9,153	$ 7,080	$ 3,950
Safeguards and Security - Construction			
85-D-105, Combined Device Assembly Facility, NTS	$ 12,200	$ 9,318	$ 4,242
Grand Total, Testing	$ 571,714	$ 562,148	$ 575,553
Testing Summary			
Operating	$ 507,614	$ 499,114	$ 526,711
Capital Equipment	45,886	47,166	37,500
Construction	18,214	15,868	11,342
Total Testing	$ 571,714	$ 562,148	$ 575,553

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Weapons Testing

IV. A. Construction Project Summary

Project Number	Project Title	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Unappropriated Balance	TEC
Core Program						
General Plant Projects						
GPD-101	General Plant Projects, NTS	$ 0	$ 0	$ 7,100	$ 0	$ 7,100
90-D-101	General Plant Projects, NTS	0	6,550	0	0	6,550
	Subtotal, General Plant Projects	$	$ 6,550	$ 7,100	$ 0	
Safeguards and Security						
85-D-105	Combined Device Assembly Facility, NTS	$ 60,042	$ 9,318	$ 4,242	$ 0	$ 73,602
	Subtotal, Safeguards and Security	$ 60,042	$ 9,318	$ 4,242	$ 0	
	Total, Testing Construction	$ 60,042	$ 15,868	$ 11,342	$ 0	

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Testing

IV. B. Plant Funded Construction Project

1. Project 85-D-105, Combined Device Assembly Facility, Nevada Test Site, Nevada

PROJECT TEC: $73,602
START DATE: 1st Qtr. FY 1985
COMPLETION DATE: 4th Qtr. FY 1991

2. Financial Schedule

Fiscal Year	Appropriation	Obligations	Costs
1985	$ 3,000	$ 3,000	$ 2,789
1986	7,000	6,728	4,633
1987	9,842	1,060	3,246
1988	28,000	27,053	11,344
1989	12,200	20,723	23,118
1990	9,318	9,318	15,410
1991	4,242	5,720	13,062

3. Narrative:

This project will provide a new multistructure, nuclear combined device assembly facility (DAF) containing approximately 100,000 gross square feet of floor space within a 22 acre, high security exclusion area in the central portion of the Nevada Test Site (NTS). This project provides modern facilities for the consolidation of all Department of Energy (DOE) nuclear test device assembly functions and a capability for the disassembly of damaged or disabled nuclear weapons.

The primary purpose of this facility is to consolidate all DOE nuclear test device assembly functions at a location on the NTS which provides for deployment of optimal security measures and countermeasures and includes structures which meet current DOE safety standards for nuclear materials and high-explosive operations. In addition, the project will provide the capability for inspection and disassembly of damaged or disabled nuclear weapons.

The FY 1991 final year funding is requested to continue and allow completion of construction, inspection of construction, and procurement of special and standard equipment.

The TEC for this project has increased by $4.1 million due to increases in the prime construction contract, requirement for special doors, additional security items, and other miscellaneous increases.

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(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Testing

IV. B. Plant Funded Construction Project

1. Project 85-D-105, Combined Device Assembly Facility, Nevada Test Site, Nevada

PROJECT TEC: $73,602
START DATE: 1st Qtr. FY 1985
COMPLETION DATE: 4th Qtr. FY 1991

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$22,912	$23,118	$15,410	$13,062	$ 0
Capital Equipment	0	0	0	0	0
Operating Expenses	$ 600	0	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

LEAD TABLE

Weapons Production and Surveillance

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
Operating Expense	$1,795,757 a/	$1,968,217 a/	$1,968,217	$2,299,880	$ +331,663	+ 17%
Capital Equipment	$ 103,786 b/	$ 113,393 f/	$ 113,393	$ 128,571	$ +15,178	+ 13%
Construction						
Programmatic	$ 182,110 c/	$ 259,882 g/	$ 259,882	$ 287,790	$ +27,908	+ 11%
Environment, Safety, and Health	13,978 d/	27,609 h/	27,609	21,415	- 6,194	- 22%
Safeguards and Security	10,275	5,417 i/	5,417	19,344	+13,927	+257%
Subtotal, Construction	$ 206,363	$ 292,908	$ 292,908	$ 328,549	$ +35,641	+ 12%
Total PEE	$2,103,906	$2,374,518	$2,374,518	$2,757,000	$ +382,482	+ 16%
Staffing (FTEs)	800	864	864	869		

Footnotes for Production and Surveillance Load Table

a/ FY 1989 Appropriation - $1,909,445,000. Reflects transfer of $115,688,000 to the Office of Environmental Restoration and Waste Management. Does not reflect $2,521,000 transferred to Weapons Program Direction for consolidation of Headquarters contractual support activities germane to all program offices.

b/ FY 1989 Appropriation - $118,614,000. Reflects transfer of $10,410,000 to the Office of Environmental Restoration and Waste Management. Reflects adjustment of $4,418,000 reprogrammed for Material Production and Defense Waste activities.

c/ FY 1989 Appropriation - $186,616,000. Reflects transfer of $4,506,000 to the Office of Environmental Restoration and Waste Management

d/ FY 1989 Appropriation - $22,278,000. Reflects transfer of $7,801,000 to the Office of Environmental Restoration and Waste Management. Reflects adjustment of $499,000 reprogrammed for Security Investigations activities.

e/ FY 1990 Appropriation - $2,100,000,000. Reflects sequestration of $31,500,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177). Reflects transfer of $100,253,000 to the Office of Environmental Restoration and Waste Management.

f/ FY 1990 appropriation $125,600,000. Reflects sequestration of $1,884,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177). Reflects transfer of $10,323,000 to the Office of Environmental Restoration and Waste Management.

g/ FY 1990 appropriation $279,174,000. Reflects sequestration of $4,187,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177). Reflects transfer of $15,105,000 to the Office of Environmental Restoration and Waste Management.

h/ FY 1990 appropriation $37,100,000. Reflects sequestration of $557,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177). Reflects transfer of $8,934,000 to the Office of Environmental Restoration and Waste Management.

i/ FY 1990 appropriation $5,500,000. Reflects sequestration of $83,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177).

DEPARTMENT OF ENERGY
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ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

SUMMARY OF CHANGES

Weapons Production and Surveillance

FY 1990 Appropriation	$2,374,518
Adjustments	0
FY 1991 Base	$2,374,518
Program Increases and Decreases	
· Increase to reflect the Administration's inflation projection for all operating expenses	$ +82,665
· Increase, above inflation, of direct operating expenses to produce, deliver, maintain, evaluate, modify, improve, and retire warheads, bombs, and shells in accordance with the nuclear weapons delivery schedule, including process development and other costs	+14,430
· Real growth to indirect operating expenses necessary to maintain the complex-wide production capability. Change is driven primarily by increased safety and health, plant maintenance, and security requirements	+37,588
· Increase to reflect higher contractor personnel benefit costs (health and life insurances and pensions)	+19,680
· Increase to pay one-half of contractually owed monies to the Monsanto Company to closeout medical benefits	+23,000
· Increase to support the transportation safeguard initiative	+19,700
· Increase to provide funds to respond to requirements of draft DOE Order 5480.XX, Training Accreditation	+23,000
· Increase to support the Rocky Flats operational improvements initiative	+155,000
· Increase in capital equipment to maintain equipment asset base	+ 2,978
· Change in weapon systems construction due primarily to a reduction in funding for the W89 Short-Range Attack Missile II	- 7,628
· Increase in construction for production support facilities attributed primarily to funding for the construction phase of the Plutonium Recovery Modification Project and Facilities Capability Assurance Program	+12,856
Environment, Safety, and Health Construction	
· Change reflects three ongoing projects and initiation of three new projects	$ -14,694
Safeguards and Security Construction	
· Continue one ongoing project and initiation of one new project	$ +13,927
FY 1991 Congressional Budget Request	$2,757,000

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

WEAPONS ACTIVITIES

I. Preface: Weapons Production and Surveillance

Weapons production and surveillance activities involve the procurement of materials; fabrication and assembly of new nuclear weapons and weapon components; life-time maintenance and reliability assessment of the existing stockpile; development and operation of safe-secure systems for transporting nuclear weapons and weapons components; preparation, issuance, and maintenance of field training manuals; and facility startup and standby operations. This category also contains the funding for Federal employment and related services at the Albuquerque Operations Office, Oak Ridge Operations Office, Savannah River Operations Office, and Rocky Flats Office, in support of the production and surveillance mission. Funding for the construction of production facilities, procurement of capital equipment, and for plant operations is included in this request.

Weapons production and surveillance operating expense funding is divided into five major categories: War Reserve New Production, Stockpile Maintenance, Stockpile Evaluation, Process Development, and Other Costs. The description of these categories is as follows:

War Reserve New Production

This includes direct and indirect costs incurred for procurement and/or manufacture of materials, piece parts, and assemblies required in the final assembly of warheads to be delivered to the Department of Defense in direct compliance with the Nuclear Weapons Stockpile Memorandum covering the budget period as well as future years, and for production/process engineering required to support future weapons delivery.

Stockpile Maintenance

Maintenance of the existing stockpile includes funding required to maintain weapon and weapon components currently in the nuclear weapons war reserve stockpile and those to be delivered to the stockpile. Included are the costs associated with repairing nuclear weapons and significantly modifying or modernizing older nuclear weapons in the stockpile. Funding is also provided to procure, fabricate, and assemble material and piece parts into weapon components which will be used to replace like components having limited life, including special nuclear materials. The costs incurred to retire and disassemble nuclear weapons from the stockpile are also funded under this subactivity.

Stockpile Evaluation

This provides the funding required to assure the high quality and reliability of nuclear weapons and components in the war reserve stockpile and those products to be delivered to the stockpile. A vigorous reliability assessment program is necessary to continuously evaluate and determine that nuclear weapons are produced according to design specifications and that transportation, deployment, and storage of nuclear weapons over their stockpile lifetime do not result in degradation. Quarterly reliability reports are issued for every weapon throughout its stockpile life.

I. Preface: Weapons Production and Surveillance (cont'd)

Process Development

The process development activity is directed toward (1) solving current problems and adequately supporting all current and planned production of new nuclear and nonnuclear weapon components in Phase 3, (2) developing new processes to improve production operations by reducing process time and/or reducing attrition of materials and improving manufacturing process yields, and (3) developing process and production techniques required to support necessary advanced technologies in order to provide for an efficient transition of new technologies into Phase 3 development programs for future weapons as defined by the weapons design laboratories.

Other Costs

This category of costs, included in the Manufacturing Support Production Base, is made up of several production and surveillance activities which are not included in product cost.

Nuclear Materials Recycle and Recovery

This major activity includes the funding required to recycle and recover nuclear material from fabrication and assembly operations, limited life components, and the recovery of special nuclear material resulting from retirements of weapons and components.

Field Engineering, Training, and Manuals

Includes the funding required for technical training of military and contractor personnel participating in evaluations of new weapons prior to complete engineering release and for liaison and training programs at DOE sites and DOD installations.

Transportation Safeguards

Includes the funding required by DOE/AL for the safe secure transportation of classified weapons, components, and strategic quantities of special nuclear materials between nuclear processing facilities and storage sites or other final destinations. Includes funding for personnel and related costs of the Albuquerque Operations Office Transportation Safeguards Division.

Facility Startup

Includes funding for operational testing, training of operating personnel, and similar costs involved in the preparation of new facilities or reactivated standby facilities for weapons production operations.

Standby

Includes funding for conditioning weapons production facilities to a standby status and maintaining standby facilities for possible further use.

I. Preface: Weapons Production and Surveillance (cont'd)

Miscellaneous

This category includes funding for production and surveillance activities not included in the other classifications. Includes Federal employment and related services at the Albuquerque Operations Office, Oak Ridge Operations Office, and Savannah River Operations Office, and the Rocky Flats Office. Also includes funding for changes in inventory balances of materials, supplies, and parts on hand that are normally consumed in manufacturing, maintenance, and other operations.

Capital funding for construction of specific weapon system production facilities, construction of production support facilities, and basic equipment and computers are identified as separate activities.

Environment, Safety, and Health construction and Safeguards and Security construction are also highlighted as separate activities.

FY 1991 Budget

The largest increase in the Production and Surveillance budget is requested to continue funding two major initiatives: the Rocky Flats Operational Improvements and Transportation Safeguards. These high priority initiatives, begun in FY 1990, are discussed in the Weapons Activities Overview. The following table reflects the FY 1991 increases to Rocky Flats and transportation base funding. These costs are integrated within the Production and Surveillance budget request.

	FY 1991
Rocky Flats Operational Improvements	
Operating Expenses	$113,800
Capital Equipment	10,000
Construction	31,200
Total	$155,000
Transportation Safeguards	
Operating Expenses	$ 17,500
Capital Equipment	2,200
Total	$ 19,700

Weapons Production and Surveillance

II. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	% Change
1. Operating				
a. War Reserve New Production	$ 918,091	$ 995,985	$1,100,297	+ 10%
b. Stockpile Maintenance	220,661	246,993	284,502	+ 15%
c. Stockpile Evaluation	189,436	205,086	215,702	+ 5%
d. Process Development	100,806	112,616	115,932	+ 3%
e. Other Costs	364,763	407,537	583,447	+ 43%
Subtotal, Operating Funds	$1,793,757	$1,968,217	$2,299,880	+ 17%
2. Capital Equipment				
a. P&S Basic Equipment	$ 88,786	$ 97,943	$ 112,671	+ 15%
b. P&S Computers	15,000	15,450	15,900	+ 3%
Subtotal, Capital Equipment	$ 103,786	$ 113,393	$ 128,571	+ 13%
3. Construction				
a. Weapons Systems Projects	$ 26,000	$ 48,462	$ 40,834	- 16%
b. Facilities Capability Assurance Program	79,341	81,853	131,806	+ 61%
c. Production Support Facilities	50,081	105,223	78,800	- 25%
d. General Plant Projects	26,688	24,344	36,350	+ 49%
Subtotal, Production Base Construction	$ 182,110	$ 259,882	$ 287,790	+ 11%
4. Environment, Safety, and Health - Construction	$ 13,978	$ 27,609	$ 21,415	- 22%
5. Safeguards and Security - Construction	$ 10,275	$ 5,417	$ 19,344	+257%
Total, Production & Surveillance	$2,103,906	$2,374,518	$2,757,000	+ 16%

Weapons Production and Surveillance

11. B. Major Laboratory and Facility Funding

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Albuquerque Operations Office	$ 128,281	$ 143,283	$ 150,933	- 7
Los Alamos National Laboratory	52,533	53,963	58,900	+ 9
Sandia National Laboratories	137,801	121,760	136,700	+12
Pantex Plant	176,676	209,448	217,836	+ 4
Kansas City Plant	422,051	479,815	541,137	+13
Mound Plant	138,595	172,446	209,626	+21
Pinellas Plant	109,095	124,353	122,332	- 2
Rocky Flats Plant	411,236	444,748	676,012	+52
Savannah River Plant	97,302	100,662	79,770	-21
Y-12 Plant, Oak Ridge	430,340	504,040	563,754	+12

Weapons Production and Surveillance

III. Activity Description

Program Activity	FY 1989	FY 1990	FY 1991
Operating Expenses			
a. War Reserve New Production	Supported weapons production and deliveries in accordance with national security requirements.	Direct costs in FY 1990 support weapons production and deliveries in accordance with national security requirements.	Direct costs in FY 1991 continue to support weapons production and deliveries in accordance with national security requirements.
	$ 918,091	$ 995,985	$1,100,297
b. Stockpile Maintenance	Supported scheduled stockpile maintenance activities for systems which were in stockpile or those delivered to the stockpile.	Same activities as FY 1989. Supports scheduled stockpile maintenance activities for stockpile systems and those to be delivered to the stockpile. FY 1990 reflects changes in activity in the Stockpile Improvement Program (SIP), and modifications, repairs, and other support associated with systems in the stockpile.	Same activities as FY 1990. Fully supports scheduled stockpile maintenance activities for stockpile systems and those to be delivered to the stockpile. FY 1991 reflects changes in activity in the Stockpile Improvement Program (SIP), and modifications, repairs, and other support associated with systems in the stockpile.
	$ 220,661	$ 246,993	$ 284,502
c. Stockpile Evaluation	Provided for evaluation and testing activities for weapon components and all systems in stockpile and those delivered to stockpile. Assured high quality and reliability of nuclear weapons and components. This activity maintained the required level of effort in FY 1989 to support systems in war reserve and new systems in production/preproduction during the budget period. Overall program-mix and activity is consistent with prior year.	Provides for evaluation and testing activities for weapon components and all systems in stockpile and those to be delivered to stockpile. Assures high quality and reliability of nuclear weapons and components. This activity largely maintains the required level of effort in FY 1990 to support systems in war reserve and new systems in production/preproduction during the budget period. Overall program mix and activity is consistent with prior year.	Provides for evaluation and testing activities for weapon components and all systems in stockpile and those to be delivered to stockpile. Assures high quality and reliability of nuclear weapons and components. This activity maintains the required level of effort in FY 1991 to support systems in war reserve including new systems in production/preproduction during the budget period. Overall program mix and activity is consistent with prior year.
	$ 189,436	$ 205,086	$ 215,702

Weapons Production and Surveillance

III. Activity Description (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
d. Process Development	Continued level of effort activities with the W89 Short-Range Attack Missile II and B90 Nuclear Depth/Strike Bomb systems increasing development workload. Process development activities maintain the necessary technology base at the production plants for acquisition of unique and essential nuclear weapons manufacturing capabilities as well as responding to new requirements.	Same activities as FY 1989 with FY 1990 level of effort held to a minor increase over escalation. Process development activities maintain the necessary technology base at the production plants for acquisition of unique and essential nuclear weapons manufacturing capabilities as well as responding to new requirements.	Same activities as FY 1990 with FY 1991 level of effort held to escalation. Process development activities maintain the necessary technology base at the production plants for acquisition of unique and essential nuclear weapons manufacturing capabilities as well as responding to new requirements.
	$ 100,806	$ 112,616	$ 115,932
e. Other Costs	Continued several production and surveillance activities with the major effort in the nuclear material recycle and recovery activity category.	FY 1990 activities same as FY 1989 with change in level of effort in the nuclear material recycle and recovery activity category, except for the transfer of funding ($2,521,000) to Weapons Program Direction as indicated in the Lead Table footnote a.	FY 1991 activities same as FY 1990 with exception of inclusion of (1) $73.1 million for the continuation of the Rocky Flats plant operational improvements, (2) funding of $23.0 million to support requirements of new DOE Draft Order 5480.XX, Training Accreditation, (3) funding of $17.3 million for continuation of the enhanced nuclear weapons transportations safety program, (4) funding of $23.0 million to pay approximately one-half of monies owed Monsanto Company for closeout medical benefits.

Weapons Production and Surveillance

III. Activity Description (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
e. Other Costs (continued)			There are higher Nuclear Material Recycle and Recovery (NMRR) costs at Rocky Flats to comply with safety and health regulations associated with plutonium processing and radiation monitoring. Other higher costs at Rocky Flats are due to more stringent security requirements and modification of SNT vehicles. Other higher NMRR costs are due to increased Los Alamos National Laboratory technical support of the plutonium recovery modification project activities. Startup costs for the Replacement Tritium Facility at Savannah River are requested at $7.1 million.
	$ 364,763	$ 407,537	$ 583,447

Weapons Production and Surveillance

III. Activity Description (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
The following table details the Other Costs expenses:			
Nuclear Material Recycle and Recovery			
Base	$ 231,964	$ 267,186	$ 306,975
Rocky Flats Operational Improvements	0	0	73,100
Subtotal	$ 231,964	$ 267,186	$ 380,075
Field Engineering and Training Activities	5,200	5,176	5,506
Secure Transportation			
Base	$ 57,292	$ 62,909	$ 69,500
Initiative	0	0	17,500
Subtotal	$ 57,292	$ 62,909	$ 87,000
Facility Startup/ Standby	15,706	11,195	19,122
Miscellaneous	54,603	61,971	91,744
Total Other Costs	$ 364,763	$ 407,537	$ 583,447

f. Indirect Expense

The following summarizes the indirect expenses contained in the War Reserve New Production, Stockpile Maintenance, Stockpile Evaluation, Process Development, and Other Costs:

Continued activities that consist of manufacturing indirect support, management and administration, protective services, and maintenance and utilities. These activities	Continues activities that consist of manufacturing indirect support, management and administration, protective services, and maintenance and utilities. These activities	Continues activities that consist of manufacturing indirect support, management and administration, protective services, and maintenance and utilities. These activities

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III. Activity Description (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
	constitute the operational base that was required to support the large nuclear weapons production complex.	constitute the operational base that is required to support the large nuclear weapons production complex.	constitute the operational base that is required to support the large nuclear weapons production complex.
	FY 1989 level was about the same as FY 1988 except for a minor increase to reflect the surfacing of concerns about health and safety issues late in the year.	FY 1990 reflects the advent of a new era of increased focus on safety and health and compliance with regulations. Addressing these requirements to make needed changes to improve the quality of operations at all sites is DOE's highest near-term priority and dictates a change in use of available resources.	FY 1991 continues the new culture of improvements in the quality of operations throughout the complex. FY 1991 reflects real growth over FY 1990. The change in FY 1991 is primarily driven by the Rocky Flats operational improvements, implementation of training accreditation program payment of Monsanto medical closeout connected with the FY 1989 contractor changeover at the Mound Plant, new safeguards and security orders, safety and health activities, and facility maintenance improvements connected with health and safety requirements.
		FY 1990 level reflects real growth over FY 1989 as a result of increases in health and safety, maintenance and utilities, and manufacturing indirect support activities. These increases are driven by an improved quality of operation.	
	$962,371	$1,068,280	$1,284,620

III. Activity Description (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Capital Equipment (ADP Leases)	Provided for needed items funded through lease arrangements. Annual lease costs are shown by item in the budget year; however, subtotals are indicated as non-add since lease funding is spread among all production and surveillance operating activities.	Provides for needed items to be funded through lease arrangements. Annual lease costs are shown by item in the budget year; however, subtotals are indicated as non-add since lease funding is spread among all production and surveillance operating activities.	Following is a list of the FY 1991 lease items to continue efforts to improve the efficiency and effectiveness of the nuclear weapons production complex: Replace Classified Vax Cluster, Rocky Flats Plant ($200) Dynaxa Replacement Processor, Y-12 ($2,200) Shop Floor Data System, Phase 6, Kansas City Plant ($600) General Purpose System External Storage, Kansas City Plant ($385) CIM #1 CPU Replacement, Rocky Flats Plant ($400) CIM Computer Upgrade No. 3, Kansas City Plant ($200) Replace DCN Supervisor System, Rocky Flats Plant ($250) CFS Enhancement, Rocky Flats Plant ($100) CIM Production System No. 1 Replacement, Kansas City Plant ($263) Classified System Upgrade #3, Pantex Plant ($825) Central Fac. Enhan. Data Integ Proc. II, Y-12 Plant ($525) CAE System, Y-12 Plant

Weapons Production and Surveillance

III. Activity Description (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
			($250) Continuation of Prior-Year Authorized Leases ($2,841)
Basic Equipment	($ 5,257) Provided funding for the acquisition of equipment to provide an adequate capability in the production complex to meet the heavy workload. Provided a minimum effort toward the continuing upgrading of environmental, technical safety, and hazardous waste requirements and to arrest the continuing deterioration of equipment in the production complex.	($ 3,759) The funding is at a level necessary to support the replacement and addition of critical equipment to maintain a viable production base for the weapons production complex. There are two major items of equipment: Anion Exchange - Rocky Flats Plant, TEC $5,000 Cryogenic Distillation System for Isotope Separation - Savannah River Plant, TEC $8,000	($ 9,839) The requested funding supports (1) $10 million for Rocky Flats operational improvements, (2) $2.2 million for Transportation Safeguards; and (3) critical equipment to upgrade the capital asset base of the weapons production complex. There are three major items of equipment: Replacement Jet Aircraft Acquisition, - Albuquerque Operations Office, TEC $3,500 Hydrofluorination Replacement, - Rocky Flats Plant, TEC $4,100 Computed Tomography System, - Kansas City Plant, TEC $1,560
Subtotal, Basic Equipment	$ 88,786	$ 97,943	$ 112,671
P&S Computers	Provided general purpose ADP and the computer integrated manufacturing (CIM) equipment required to support war reserve new production, and stockpile maintenance and reliability.	Provides general purpose ADP and the computer integrated manufacturing (CIM) equipment required to support war reserve new production, and stockpile maintenance and reliability.	Provides the following major items of ADP equipment: Upgrade General Purpose System No. 2, Kansas City Plant ($3,400) Procede Auto Manufacturing System, Phase 3, Mound Plant ($1,000) Upgrade CCF Production System, Mound Plant

III. Activity Description (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
			($1,200) Dyncas Replacement Processor, Y-12 Plant ($1,900) Classified System Replacement, Pinellas Plant ($1,600) Unclassified System, Pantex Plant ($2,900) Control Computer #2 CPU Upgrade, Rocky Flats Plant ($1,700) CIM Distributed Work Stations, Rocky Flats Plant ($1,400) Optical Disk Library System, Rocky Flats Plant ($1,000)
Subtotal, MSA Computers	$ 15,000	$ 15,450	$ 15,900
Total Capital Equipment	$ 103,786	$ 113,393	$ 128,571
Construction			
a. Weapons Systems:			
91-D-122, Short Range Attack Missile - Tactical warhead Production Facilities, VL	$ 0	$ 0	$ 15,000
90-D-122, Nuclear Depth/Strike Bomb Production Facilities, VL	0	7,880	13,700
90-D-123, Follow-on To Lance Production Facilities, VL	0	0	3,500

Weapons Production and Surveillance

III. Activity Description (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991	
87-D-122, W88 II Warhead Production Facilities, YL	$ 26,000	$ 40,562	$ 8,634	
Subtotal, Weapon Systems	$ 26,000	$ 48,462	$ 40,834	
b. Facilities Capability Assurance Program (FCAP):				Reflects continuation of 3 projects for Rocky Flats operational improvements.
88-D-122, FCAP	$ 79,341	$ 81,853	$ 131,806	
c Production Support Facilities:				
91-D-123, Production Assurance Transformer Replacement, Kansas City	$ 0	$ 0	$ 2,400	
90-D-124, HE Synthesis Facility, Pantex	0	1,775	0	
89-D-125, Plutonium Recovery Modification Project, Rocky Flats	4,000	44,325	65,000	
88-D-125, HE Machining Facility, Pantex	13,000	35,440	8,840	
86-D-130, Tritium Loading Facility Replacement, SR	31,800	23,445	2,360	

Weapons Production and Surveillance

III. Activity Description (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
85-D-112, Enriched Uranium Recovery Improvements, Y-12	$ 1,281	$ 0	$ 0
Subtotal, Production Support Facilities Construction	$ 50,081	$ 105,223	$ 78,800
d. General Plant Projects:			Reflects an increase of $4 million to support operational improvements at Rocky Flats and to continue required upgrades and replacements of basic infrastructure.
GPD-121, General Plant Projects, VA	$ 26,688	$ 24,344	$ 36,350
Total, Programmatic Construction	$ 182,110	$ 259,882	$ 287,790
Environment, Safety, and Health			
91-D-125, ES&H, Phase III, Round	$ 0	$ 0	$ 1,744
91-D-126, Health Physics Calibration Facility, Round	0	0	1,000
91-D-127, Critical Alarm and Production Annunciation Utility Replacement, Rocky Flats	0	0	6,600
90-D-126, ES&H Enhancements, VA	0	21,542	Reflects continuation of 4 projects for Rocky Flats operational improvements. 8,500

Weapons Production and Surveillance

III. Activity Description (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
89-D-126, Environmental, Safety, and Health Upgrade, Phase II, Mound	$ 174	$ 748	$ 488
88-D-126, Personnel Radiological Monitoring Labs, VL	5,000	0	1,400
88-D-124, Fire Protection Upgrading, VL	6,500	5,319	1,481
86-D-123, Environmental Hazards Elimination, VL	2,304	0	0
Total, Environment, Safety, and Health	$ 13,978	$ 27,609	$ 21,413
Safeguards and Security			
91-D-124, SAS Upgrade, Phase III, Mound	$ 0	$ 0	$ 1,100
88-D-123, Security Enhancements, Pantex	7,500	5,417	18,244
84-D-211, Safeguards and Site Security Upgrading, Y-12	2,775	0	0
Total, Safeguards and Security	$ 10,275	$ 5,417	$ 19,344
Grand Total, Production and Surveillance	$2,183,906	$2,374,518	$2,757,000

III. Activity Description (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Production and Surveillance Summary			
Operating	$1,793,757	$1,968,217	$2,299,880
Capital Equipment	103,786	113,393	128,571
Construction	206,363	292,908	328,549
Total	$2,103,906	$2,374,518	$2,757,000

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. A. Construction Project Summary

Project Number	Project Title	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Unappropriated Balance	TEC
Weapons Systems Construction						
91-D-122	Short-Range Attack Missile Tactical Warhead Production Facilities, VL	$ 0	$ 0	$ 15,000	$ 80,000	$ 95,000
90-D-122	Production Facilities for the Nuclear Depth/Strike Bomb (ND/SB), VL	0	7,880	13,700	35,420	57,000
90-D-123	Follow-on to Lance (FOTL) Production Facilities, VL	0	0	3,500	41,800	45,300
87-D-122	Short-Range Attack Missile II (SRAM II) Warhead Production Facilities, VL	26,984	40,582	8,634	0	76,200
	Subtotal, Weapons Systems Construction	$ 26,984	$ 48,462	$ 40,834	$ 157,220	
Facilities Capability Assurance Program						
88-D-122	Facilities Capability Assurance Program, VL	$ 94,741	$ 81,853	$ 131,806	$ 226,350	$ 534,750
	Subtotal, Facilities Capability Assurance Program	$ 94,741	$ 81,853	$ 131,806	$ 226,350	

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
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KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. A. Construction Project Summary

Project Number	Project Title	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Unappropriated Balance	TEC
Production Support Facilities						
91-D-123	Production Assurance Transformer Replacement, Kansas City Plant, Kansas City, MO	$ 0	$ 0	$ 2,600	$ 0	$ 2,600
90-D-124	HE Synthesis Facility, Pantex Plant	0	1,773	0	12,927	14,700
89-D-125	Plutonium Recovery Modification Project, Rocky Flats Plant, Golden, CO	4,000	44,325	65,000	TBD	TBD
88-D-125	High Explosive Machining Facility, Pantex Plant, Amarillo, TX	15,700	35,460	8,840	0	60,000
86-D-130	Tritium Loading Facility Replacement, Savannah River Plant, Aiken, SC	117,975	23,665	2,360	0	144,000
	Subtotal, Production Support Facilities	$ 137,675	$ 105,223	$ 78,800	$ 12,927	
General Plant Project						
GP-D-121	General Plant Projects, VL	$ 0	$ 0	$ 36,350	$ 0	$ 36,350
90-D-121	General Plant Projects, VL	0	24,344	0	0	24,344
	Subtotal, General Plant Projects	$ 0	$ 24,344	$ 36,350	$ 0	

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ATOMIC ENERGY DEFENSE ACTIVITIES
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KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. A. Construction Project Summary

Project Number	Project Title	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Unappropriated Balance	TEC
Environmental, Safety, and Health Construction						
91-D-125	ES&H, Phase III, Mound Plant, Miamisburg, OH	$ 0	$ 0	$ 1,746	$ 1,204	$ 2,950
91-D-126	Health Physics Calibration Facility, Mound Plant, Miamisburg, OH	0	0	1,000	4,000	5,000
91-D-127	Criticality Alarm and Production Annunication Utility Replacement, Rocky Flats, Golden, CO	0	0	6,600	12,400	19,000
90-D-126	ES&H Enhancements, VL	0	21,542	8,500	50,678	80,720
89-D-126	Environmental, Safety, and Health Upgrade, Phase II, Mound Plant, Miamisburg, OH	174	748	488	0	1,410
88-D-126	Personnel Radiological Monitoring Laboratories, VL	6,000	0	1,600	0	7,600
88-D-124	Fire Protection Upgrading, VL	8,200	5,319	1,481	0	15,000
	Subtotal, Environment, Safety, and Health Construction	$ 6,174	$ 27,609	$ 21,415	$ 68,282	

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FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
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KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. A. Construction Project Summary

Project Number	Project Title	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Unappropriated Balance	TEC
Safeguards and Security Construction						
91-D-124	Safeguards and Security Upgrade, Phase III, Mound Plant, Miamisburg, OH	$ 0	$ 0	$ 1,100	$ 12,690	$ 13,790
88-D-123	Security Enhancements, Pantex Plant, Amarillo, TX	13,200	5,417	18,244	72,839	109,700
	Subtotal, Safeguards and Security	13,200	5,417	19,344	85,529	
	Total, Production and Surveillance Construction	279,778	292,968	326,543	550,398	

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project GPO-121, General Plant Projects
Various Locations

PROJECT TEC: $36,350
START DATE: 1st Qtr. FY 1991
COMPLETION DATE: 4th Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 36,350	$ 36,350	$14,900
1992	0	0	15,950
1993	0	0	5,500

3. Narrative:

This project provides for general plant improvements such as construction or modifications of roads, utilities, minor structures, and technical facilities required in the operation of the weapons production plants. Requirements for small projects of this type cannot be fully detailed 2 years in advance of the need. Therefore, a list of example subprojects is provided in the data sheet for each plant at to indicate typical sizes and kinds of construction to be performed.

Funding for general plant projects is necessary to meet new and changing program developments, to correct deficiencies, and for minor utility and road construction.

The requested FY 1991 funding will be used for design and construction of small construction projects of the types identified in the construction project data sheet.

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$14,900	$21,450
Capital Equipment	0	0	0	0	0
Operating Expenses	$ 0	0	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 91-D-122, Short Range Attack Missile Tactical (SRAM T)
Production Facilities,
Various Locations

PROJECT TEC: $95,000
START DATE: 2nd Qtr. FY 1991
COMPLETION DATE: 4th Qtr. FY 1995

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$15,000	$15,000	$10,000
1992	47,100	47,100	30,000
1993	25,400	25,400	25,000
1994	7,500	7,500	20,000
1995	0	0	10,000

3. Narrative:

This project provides additional production capacity and capability required by the weapons production complex to produce nuclear warheads for the Short Range Attack Missile Tactical (SRAM T) program. Capital requirements at the weapons production plants will consist primarily of standard equipment and specialized facilities. A new approximately 62,000 gross square foot Production Engineering Support facility will be constructed at Pantex.

The design reflected in this construction project data sheet is assumed to be the LLNL/SNLL design Document PID FT-01, dated September 1989. Workload guidance used as a basis for the project is contained in the Production and Planning Directive 89-4, dated October 5, 1989.

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$10,000	$ 85,000
Capital Equipment	0	0	0	0	0
Operating Expenses	0	90	130	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 91-D-123, Production Assurance Transformer Replacement, Kansas City Plant, Kansas City, Missouri

PROJECT TEC: $2,600
START DATE: 4th Qtr. FY 1991
COMPLETION DATE: 3rd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$2,600	$2,600	$ 250
1992	0	0	1,900
1993	0	0	450

3. Narrative:

This project will remove and replace polychlorinated biphenyl (PCB) filled and PCB contaminated electrical power systems equipment at the Kansas City Plant. Thirteen PCB power transformers will be replaced with modern environmentally safe, dry type, cast-resin transformers for indoor applications and mineral oil-filled transformers for outdoor applications. The switchgear will be reconfigured with fusible, single cable air switches with current limiting fuses to provide overcurrent protection for the new transformers.

All electrical system reconfiguration is as recommended by an outside consulting engineering in a "Pre-Design, Electrical System Study, May 1984." The purpose of the study was to define the configuration of an electrical distribution system should the Kansas City Plant upgrade the distribution system and replace a majority of the old PCB transformers, elimination of single-ended substations, consolidation of switchgear units, added substation capacity at some locations, and a new 15kV power distribution cable plan. The benefits of these recommendations include improved reliability, increased capacity, improved electrical safety, and a simplified system without sacrificing capability.

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 250	$ 2,350
Capital Equipment	0	0	0	0	0
Operating Expenses	45	0	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 91-D-124, Safeguards and Security Upgrade, Phase III
Mound Plant
Miamisburg, Ohio

PROJECT TEC: $13,790
START DATE: 1st Qtr. FY 1992
COMPLETION DATE: 4th Qtr. FY 1994

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 1,100	$ 1,100	$ 600
1992	4,550	4,550	3,000
1993	5,550	5,550	6,000
1994	2,590	2,590	2,500
1995	0	0	1,690

3. Narrative:

The work needed to complete the Safeguards and Security Upgrade at Mound is defined in seven required subprojects. Each subproject is justified based on specific sections of the new DOE Order 5630 and 5632.2A which provide Safeguards and Security Guidelines. This Safeguards and Security Upgrade, Phase III, completes the overall upgrade requirements defined by these orders. These upgrades address both insider and outsider threats against SNM and production facilities at Mound. The overall protection of these assets will be achieved by installation of a performance oriented integrated safeguards and security system. The plant perimeter entry posts will be upgraded to provide permanent, serviceable facilities for access control. Insider threat measures are being upgraded by improving Special Nuclear Material (SNM) control and protective force communications security. Improved SNM control includes upgrading the inventory control and accountability of Tritium and Tritium Recovery and improved management of SNM waste. The security of internal communications will be upgraded by providing a system that cannot be monitored or easily obstructed by other systems. A training facility is included for building and maintaining the Protective Force and Special Response Teams' capability.

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 600	$13,190
Capital Equipment	0	0	0	0	0
Operating Expenses	90	180	230	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 91-D-125, Environmental, Safety, & Health Upgrade, Phase III,
Mound Plant,
Miamisburg, Ohio

PROJECT TEC: $2,950
START DATE: 2nd Qtr. FY 1991
COMPLETION DATE: 4th Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 1,746	$ 1,746	$ 1,200
1992	1,204	1,204	1,400
1993	0	0	350

3. Narrative:

The mission of this project is to ensure that Mound's activities are in compliance with all Federal, state, and local regulations. This project is a third major part of an overall program under DOE Environmental, Safety, and Health guidance to the various sites. This project is a follow on to Project 89-D-126, Environmental, Safety, and Health Upgrade, Phase II. The project consists of two subprojects:

a. Solvent Waste Handling will provide a licensed hazardous waste incinerator with its associated equipment. The incineration process will be housed in a new 800 square foot structure located adjacent to the existing Waste Disposal (WD) building. Off gas scrubbers and mist eliminators are included. It will also provide improvements to the existing solvent waste handling facilities which include pumps and piping necessary to pump the waste to the incinerator location and a 200 square foot prefabricated building for solvent filtration.

b. Environmental Buffer Zone consists of purchasing land along the northwest boundary of the Mound Plant to create an environmental buffer zone between the adjacent properties. Acquisition of this property will provide Mound with better control of ground water monitoring facilities located within the buffer zone. Should a hazardous spill occur along the northwest border, the buffer zone will enable Mound to contain the spill on the facility's property, thus preventing damage to the property of others and will make clean up and control much easier.

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DEPARTMENT OF ENERGY
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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 91-D-125, Environmental, Safety, & Health Upgrade, Phase III,
Mound Plant,
Miamisburg, Ohio

PROJECT TEC: $2,950
START DATE: 2nd Qtr. FY 1991
COMPLETION DATE: 4th Qtr. FY 1993

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 1,200	$ 1,750
Capital Equipment	0	0	0	0	0
Operating Expenses	200	0	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 91-D-126, Health Physics Calibration Facility,
Mound Plant,
Miamisburg, Ohio

PROJECT TEC: $5,000
START DATE: 2nd Qtr. FY 1992
COMPLETION DATE: 3rd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$1,000	$1,000	$ 690
1992	4,000	4,080	2,750
1993	0	0	1,560

3. Narrative:

This project provides a new Health Physics Calibration facility which can meet all of the critical environmental, physical, and radiological criteria for an up-to-date facility. The facility will provide a consolidated and centralized plant service for repair and calibration of Health Physics instrumentation and personnel dosimetry. This will allow Mound to meet the requirements of the Department of Energy Laboratory Accreditation Program (DOELAP) - DOE Order 5483, the National Bureau of Standards (NBS) and ANSI standards; as well as more efficiently perform its current mission.

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 690	$ 4,310
Capital Equipment	0	0	0	0	0
Operating Expenses	150	0	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 91-D-127, Criticality Alarm and Production Annunciation Utility Replacement
Rocky Flats Plant,
Golden, Colorado

PROJECT TEC: $19,000
START DATE: 3rd Qtr. FY 1991
COMPLETION DATE: 4th Qtr. FY 1994

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$6,600	$6,600	$2,000
1992	6,100	6,100	6,000
1993	6,300	6,300	6,000
1994	0	0	5,000

3. Narrative:

This project will provide for the replacement of 52 Production Annunciation Utilities in 65 buildings and the segregation of criticality alarm systems in 25 fissile material handling buildings at the Department of Energy's Rocky Flats Plant. The existing systems are used to broadcast criticality alarms and relay emergency and production information to plant personnel. This project includes the replacement of all existing Production Annunciation System components and the addition of duplicate systems in fissile material handling buildings for amplifying and broadcasting criticality alarms. In addition, the phone lines which tie each of the building systems to the Central Dispatch Office will be replaced by a fiber optics network.

The existing Production Annunciation Utility is worn, failing, inadequate to meet current production requirements and industry standards, unreliable, unmaintainable, and not designed for current building size and use.

The Production Annunciation Utility is the primary means of informing plant personnel when immediate announcements are required concerning production, security, radiation contamination, weather, or emergency situations such as fire or terrorist actions. The utility is also used to satisfy Department of Energy Order 5480.5 which requires a system in all buildings where fissile materials are handled to broadcast alarms in the event of a criticality accident. Without functioning criticality alarm systems in these buildings, production operations are stopped.

DEPARTMENT OF ENERGY
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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 91-D-127, Criticality Alarm and Production Annunciation Utility Replacement
Rocky Flats Plant,
Golden, Colorado

PROJECT TEC: $19,000
START DATE: 3rd Qtr. FY 1991
COMPLETION DATE: 4th Qtr. FY 1994

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 2,000	$ 17,000
Capital Equipment	0	0	0	0	0
Operating Expenses	280	0	0	0	0

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FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 90-D-122, Production Capabilities for the Nuclear Depth/Strike Bomb (ND/SB), Various Locations

PROJECT TEC: $57,000
START DATE: 1st Qtr. FY 1990
COMPLETION DATE: 2nd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 7,880	$ 7,880	$ 5,750
1991	13,700	13,700	13,000
1992	24,420	24,420	24,300
1993	11,000	11,000	11,600
1994	0	0	2,350

3. Narrative:

This project provides additional production capacity and capability required by the weapons production complex to produce nuclear warheads for the Nuclear Depth/Strike Bomb (ND/SB) program. Capital requirements at the weapons production plants will consist primarily of standard equipment, specialized facilities, new construction and additions to existing buildings needed to build weapon components.

The needs are based on design information contained in the Planning Information Document 54-01 dated July 1986 and the addition of interdependent items from the SICBM. This warhead entered Phase 3 in June 1988.

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 5,750	$13,000	$ 38,250
Capital Equipment	0	0	0	0	0
Operating Expenses	110	180	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 90-D-123, Follow On To Lance (FOTL) Production Facilities, Various Locations

PROJECT TEC: 945,300
START DATE: 4th Qtr. FY 1991
COMPLETION DATE: 1st Qtr. FY 1995

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	3,500	3,500	3,000
1992	19,400	19,400	18,000
1993	20,300	20,300	19,000
1994	2,100	2,100	4,300
1995	0	0	1,000

3. Narrative:

This project will provide modified building space, replacement process systems, special facilities, and replacement or additional equipment needed for production, inspection, testing, and certification of raw materials, components, subassemblies, and final assembly of the warhead currently proposed for the U.S. Army Follow On To Lance (FOTL) Missile. Production of this warhead requires a new press facility within one production plant and rearrangement of a facility within another production plant; new capabilities at various production plants and replacement of existing equipment and systems at various production plants. All new facilities and rearrangements will be accomplished within existing plant buildings. Capacity requirements in this line item are determined by total weapon production plants and assigned to the FOTL on a first-user basis.

4. Total Project Funding: (B/O)

	Prior Years	FY 1988	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 3,000	$ 42,300
Capital Equipment	0	0	0	0	0
Operating Expenses	100	230	0	0	0

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FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 90-D-124, High Explosive (HE) Synthesis Facility,
Pantex Plant
Amarillo, Texas

PROJECT TEC: $14,700
START DATE: 1st Qtr. FY 1992
COMPLETION DATE: 2nd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 1,773	$ 1,773	$ 1,000
1991 a/	0	0	600
1992	12,927	12,927	8,500
1993	0	0	4,600

3. Narrative:

This project consists of the design and construction of two processing bays, an oven bay, an in-process staging magazine, a control room with office space, solvent staging facility, and an equipment room. Approximately 17,900 gross square feet (11,200 net square feet excluding ramp and corridor) will be provided in this facility. The facility will be sited in accordance with the Department of Energy (DOE) Order 6430.1, Chapter XXII. The proposed location for this facility has been coordinated with the Pantex Site Development Plan. Six personnel are anticipated to operate the new facility (two supervisors and four technicians).

The design of this facility will be in accordance with the DOE Explosive Safety Manual (DOE/EV/06194-3. Revision II) and DOE Order 6430.1A for Class I, Class II, and Class III operations. High Explosive (HE) load limits will be: 150 pounds of TNT for each processing bay, 150 pounds of TNT for the oven bay, and 1,000 pounds of TNT for the in-process staging magazine.

Construction for the facility will consist of: reinforced concrete for operating bays; earth covered, steel corrugated arch for the magazine; and metal building type structures for the solvent facility, office/control room, equipment room and ramp.

a/ FY 1990 funding is required to develop project design and other performance data required to obtain the necessary permits. The permitting process will be undertaken and completed in FY 1991; therefore, no FY 1991 funding is necessary.

DEPARTMENT OF ENERGY
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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 90-D-124, High Explosive (HE) Synthesis Facility,
Pantex Plant
Amarillo, Texas

PROJECT TEC: $14,700
START DATE: 1st Qtr. FY 1992
COMPLETION DATE: 2nd Qtr. FY 1993

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 1,000	$ 600	$ 13,100
Capital Equipment	0	0	0	0	0
Operating Expenses	10	0	0	0	0

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ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 90-D-126, Environmental, Safety and Health Enhancements
Various Locations

PROJECT TEC: $80,780 a/
START DATE: 2nd Qtr. FY 1990
COMPLETION DATE: 3rd Qtr. FY 1994

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$21,542	$21,542	$ 4,842
1991	8,500	8,500	15,000
1992	27,328	27,328	25,328
1993	23,350	23,350	25,550
1994	0	0	10,000

3. Narrative:

This project provides essential enhancements to environmental, safety and health activities (ES&H); health and safety facilities; radiation monitoring, containment, and protection; and air emissions monitoring capabilities at six locations in the Production and Surveillance complex. These enhancements will include building modifications and building additions, and new systems and capabilities to better comply with existing environmental, safety, and health requirements imposed by Federal, state, and local laws and regulations, as well as by the Department of Energy.

4. Total Project Funding: (B/O)

	Prior Years	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 4,842	$15,000	$ 60,878
Capital Equipment	0	0	0	0
Operating Expenses	974	0	0	0

a/ Current cost estimate includes the addition of four Rocky Flats Subprojects (TEC = $58,850,000).

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FY 1991 CONGRESSIONAL BUDGET REQUEST
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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 89-D-125, Plutonium Recovery Modification Project,
Rocky Flats Plant,
Golden, Colorado

PROJECT TEC: $500,000-600,000 a/
START DATE: 4th Qtr. FY 1990
COMPLETION DATE: 4th Qtr. FY 1998

2. Financial schedule:

Fiscal Year	Appropriation	Obligations	Costs
1989	$ 4,000	$ 4,000	$ 3,800
1990	44,325	25,000	25,000
1991	65,000	65,000	57,400
1992	120,000	118,000	58,500
1993	125,000	125,000	121,900
1994	120,000	120,000	120,400
1995	TBD	TBD	TBD
1996	TBD	TBD	TBD
1997	TBD	TBD	TBD

3. Narrative:

The purpose of this project is to renovate Building 371 at Rocky Flats so it can replace the existing Buildings 771 and 776, which recycle and process plutonium residues and plutonium from retired nuclear weapons.

The existing buildings will be well over 40 years old when the project is complete and will have served their useful life. New safety, security and safeguards standards require plutonium processing operations in a more modern facility because the existing buildings cannot be fully upgraded to meet present safety, health, safeguards and security standards.

a/ The TEC continues to be reviewed and refined. The figure of $500,000,000-600,000,000 represents the best estimate at present. A more refined cost is expected to be available March-April 1990 after additional studies have been completed. New safety design requirements that have been invoked have increased the cost estimate 40-60 percent over the previous estimate. The TEC has not been reviewed nor approved by DOE management at this time.

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 89-D-125, Plutonium Recovery Modification Project,
Rocky Flats Plant,
Golden, Colorado

PROJECT TEC: $500,000-600,000 a/
START DATE: 4th Qtr. FY 1990
COMPLETION DATE: 4th Qtr. FY 1998

4. Total Project Funding: (B/O)

	Prior Years	FY 1990	FY 1991 Request	FY 1992	To Complete
Construction	$3,800	$25,000	$57,400	$ 58,500	$ TBD
Capital Equipment	0	0	0	0	0
Operating Expenses	87,407	30,086	23,509	17,319	49,686

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 89-D-126, Environmental, Safety, and Health Upgrade, Phase II,
Mound Plant,
Miamisburg, Ohio

PROJECT TEC: $ 6,500 a/
START DATE: 3rd Qtr. FY 1990
COMPLETION DATE: 4th Qtr. FY 1992

2. Financial schedule:

Fiscal Year	Appropriation	Obligations	Costs
1989	$ 174	$ 174	$ 25
1990	748	748	691
1991	488	488	579
1992	0	0	115

3. Narrative:

The mission of this project is to ensure that Mound's activities are in compliance with all Federal, state, and local regulations. This project is a second major part of an overall program under DOE Environmental, Safety, and Health guidance to the various sites. This project is a follow-on to Project 87-D-127, Environmental, Safety, and Health Upgrade, Phase I, and includes three subprojects listed below:

a. Potable water cross connections, new potable water system

Mound has 100 buildings where potable water lines could be contaminated by process water because of over 500 cross connections between the potable water lines and these process lines. This project will provide a New Site Potable Water System which follows the route of the existing water distribution system. The existing water distribution system will then be designated as the process water system.

b. High explosive safety upgrades

DOE Order 6430 establishes the coverage, objectives, and standards for explosive facilities safety. The magazines at the Mound site are being modified to include reduction of explosive limits, addition of barricades, and construction of three new magazines.

a/ This project cost estimate includes $5,090,000 for Corrective Actions activities, subprojects a and c, now under the Office of Environmental Restoration and Waste Management.

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 89-D-126, Environmental, Safety, and Health Upgrade, Phase II,
Mound Plant,
Miamisburg, Ohio

PROJECT TEC: $ 6,500 a/
START DATE: 3rd Qtr. FY 1990
COMPLETION DATE: 4th Qtr. FY 1992

3. Narrative (cont'd):

c. Fuel oil storage transfer system

This subproject consists of the construction of new fuel oil storage and transfer facilities to replace the current system, which has been in existence, and has remained basically unchanged, since the 1940s. Construction will consist of a new 7,140 barrel (300,000 gallon) aboveground storage tank with a dike capable of containing 150 percent of the capacity of this tank and an additional future tank of equivalent size.

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 25	$ 691	$ 579	$ 115
Capital Equipment	0	0	0	0	0
Operating Expenses	$ 130	0	0	0	0

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ATOMIC ENERGY DEFENSE ACTIVITIES
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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 88-D-122, Facilities Capability Assurance Program (FCAP)
Various Locations

PROJECT TEC: $534,750
START DATE: 2nd Qtr. FY 1988
COMPLETION DATE: Ongoing

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1988	$ 15,400	$ 15,400	$ 3,399
1989	79,341	77,487	18,503
1990	81,853	83,707	90,168
1991	131,806	131,806	131,910
1992	132,550	132,550	135,360
1993	75,400	75,400	103,720
1994	18,400	18,400	40,170
1995	0	0	10,100
1996	0	0	2,000

3. Narrative:

The purpose of FCAP is to rectify problems in the aging Nuclear Weapons Production and Surveillance Complex's (NWPSC) buildings, utilities, and other real property through an ongoing line item project. FCAP approaches this aging problem through an ongoing line item project in order to prioritize and optimize the allocation of limited capital resources. This overall investment strategy is required to assure that the capabilities to meet the NWPSC's national security mission do not erode as these facilities continue to age and deteriorate from use.

The FY 1991 funds will be used for construction of those FY 1988, FY 1989, and FY 1990 subprojects not yet fully funded and to initiate design and long lead procurement for the FY 1991 subprojects listed below.

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CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 88-D-122, Facilities Capability Assurance Program (FCAP)
Various Locations

PROJECT TEC: $534,750
START DATE: 2nd Qtr. FY 1988
COMPLETION DATE: Ongoing

3. Narrative (cont'd)

FY 1991 Subprojects

91-1. Replace Electrical System Components, Kansas City Plant (TEC = $12,700)
91-2. High Explosive Formulation Facility, Pantex Plant (TEC = $36,800)
91-3. Renovate Water Supply System, Pantex Plant (TEC = $9,500)
91-4. Central Steam Plant Renovation, Rocky Flats Plant (TEC = $3,300)
91-5. Replace Graphite Dust Collection System, Y-12 Plant (TEC = $5,300)
91-6. Refurbish Power Supply/Distribution System, Y-12 Plant (TEC = $39,000)
91-7. Site Electrical System Replacement, Mound Plant (TEC = $5,000)
91-8. Replace Temperature and Humidity Conditioning Systems, Kansas City Plant (TEC = $26,300)
91-9. Central Fire Station Replacement, Pantex Plant (TEC = $6,700)
91-10. Energetic Material Production Support Facility, Mound Plant (TEC = $19,900)

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 3,399	$18,512	$90,168	$131,910	$290,761
Capital Equipment	0	0	0	0	0
Operating Expenses	5,399	0	0	0	0

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 88-D-123, Security Enhancement, Pantex Plant, Amarillo, Texas

PROJECT TEC: $109,700
START DATE: 4th Qtr. FY 1988
COMPLETION DATE: 3rd Qtr. FY 1996 a/

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1988	$ 5,700	$ 5,700	$ 69
1989	7,500	3,500	2,586
1990	5,417	9,417	10,700
1991	18,244	18,244	16,185
1992	34,239	34,239	27,360
1993	30,000	30,000	16,300
1994	8,600	8,600	25,700
1995	0	0	9,600
1996	0	0	1,200

3. Narrative:

This project reflects security enhancements required to improve the security of the Pantex Plant relative to the current threat matrix, vulnerability assessments, and knowledge to date. The scope and priority of each subproject may be subject to subsequent revision to reflect the results of further vulnerability assessments, field exercises and inspections, and management direction. This is required to assure that the results of further threat scenario analyses are considered in the actual implementation of the projects and subprojects. An in-depth analysis of Pantex and its current ability to counter all adversary threats enumerated in the "Generic Threats to DOE Nuclear Programs and Facilities Statement," dated January 1983, included detailed vulnerability studies and credible scenarios involving a physical protection and, to a lesser extent, in material control and accountability. These security upgrades address these vulnerabilities.

a/ Long lead time procurement and installation of aircraft detection system components have extended the schedule by 9 months.

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CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 88-D-123, Security Enhancement, Pantex Plant, Amarillo, Texas

PROJECT TEC: $109,700
START DATE: 4th Qtr. FY 1988
COMPLETION DATE: 3rd Qtr. FY 1996

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 69	$2,586	$10,700	$16,185	$80,160
Capital Equipment	0	0	0	0	0
Operating Expenses	250	0	0	0	0

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(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 88-D-124, Fire Protection Upgrading
Various Locations

PROJECT TEC: $15,000
START DATE: 2nd Qtr. FY 1988
COMPLETION DATE: 4th Qtr. FY 1992

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1988	$ 1,700	$ 1,700	$ 0
1989	6,500	6,500	925
1990	5,319	5,319	4,075
1991	1,481	1,481	5,900
1992	0	0	4,100

3. Narrative:

This project will provide fire protection within the Y-12 Plant and the Pantex Plant complexes. At the Y-12 Plant, this project will provide for installation of automatic fire sprinkler systems for 14 unprotected areas, improvement to fire water supply, improvements to the existing fire detection system, upgrading the major building fire alarm system, installation of a new 16-inch underground water main, and training facilities for simulating fires in ordinary combustibles, in propane storage, and in flammable liquids. At the Pantex Plant, this project will be located in the fire station. New alarm cable will be installed throughout the plant. New sensors and building panels will be installed in each building.

The purpose of this project is to upgrade fire protection in key production facilities in areas where existing protection is currently documented as inadequate. The Y-12 Plant inadequacies have been cited by the Department of Energy (DOE) and by DOE fire protection consultants. The Y-12 Plant operations are jeopardized by inadequate fire protection. The fire detection system at the Pantex Plant is seriously outdated and unreliable. The deteriorated signal cable permits moisture to penetrate, interrupting operation. During the interruption, alarms do not register at the control center. Failure to detect and respond to a fire in the production plant could result in serious consequences for weapons production.

The requested FY 1991 funding will be used to complete construction at both locations.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
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(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 88-D-124, Fire Protection Upgrading
Various Locations

PROJECT TEC: $15,000
START DATE: 2nd Qtr. FY 1988
COMPLETION DATE: 4th Qtr. FY 1992

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 925	$ 4,075	$ 5,000	$ 4,100
Capital Equipment	0	0	0	0	0
Operating Expenses	100	0	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 88-D-125, High Explosive Machining Facility
Pantex Plant,
Amarillo, Texas

PROJECT TEC: $60,000
START DATE: 2nd Qtr. FY 1990
COMPLETION DATE: 1st Qtr. FY 1993 a/

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1988	$ 2,700	$ 2,700	$ 270
1989	13,000	13,000	2,207
1990	35,460	35,460	8,123
1991	8,840	8,840	21,000
1992	0	0	18,800
1993	0	0	9,500
1994	0	0	100

3. Narrative:

The project will provide a new machining facility for explosives at the Pantex Plant to replace the existing facility which was constructed in 1952. The project includes the procurement, temporary storage, and installation of new machining and support equipment and the relocation of some machining equipment from the existing facility. The project also includes the demolition of the existing high explosives machining building and supporting building. The new facility will contain approximately 40,670 square feet of net operating area. Three operating areas will be included in the new facility; high explosive (HE) area--18,680 square feet; insensitive high explosive (IHE) area--8,730 square feet; and a support area of 13,260 square feet.

The purpose of this project is to provide assurance for the continued and uninterrupted production of nuclear weapons and to reduce personnel risk during the machining of high explosives. Machined high explosives parts are essential major components of all nuclear weapons produced at the Pantex Plant. The main charge components are required to initiate a nuclear reaction in a weapon. The capability and capacity to machine these HE components are unique to Pantex; there are no commercial sources from which to obtain them.

The FY 1991 funding will be used to procure standard equipment and to demolish the existing facility.

a/ Completion of new facility construction and demolition of the existing facility will be completed 4th quarter, FY 1993.

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ATOMIC ENERGY DEFENSE ACTIVITIES
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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 88-D-125, High Explosive Machining Facility
Pantex Plant,
Amarillo, Texas

PROJECT TEC: $60,000
START DATE: 2nd Qtr. FY 1990
COMPLETION DATE: 1st Qtr. FY 1993

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction ..... $	270	$ 2,207	$ 8,123	$21,000	$ 28,400
Capital Equipment	0	0	0	0	0
Operating Expenses	210	0	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 88-D-126, Personnel Radiological Monitoring Laboratories, Various Locations

PROJECT TEC: $ 7,600
START DATE: 4th Qtr. FY 1988
COMPLETION DATE: 4th Qtr. FY 1991

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1988	$ 1,000	$ 1,000	$ 261
1989	5,000	5,000	632
1990	0	0	5,000
1991	1,600	1,600	1,707

3. Narrative:

This project will provide new radiological monitoring laboratories at the Rocky Flats Plant, the Pantex Plant, and the Y-12 Plant. The new laboratories at Rocky Flats and Pantex will be designed to correct deficiencies in the existing radiation monitoring program and to provide additional capabilities needed to comply with new Government regulations. The new laboratory at the Y-12 Plant will be designed to permit more reliable radiological analyses in support of plant operations.

At Pantex, a single-story, 6,000 square-foot building will be built of noncombustible materials to accommodate several environmental and radiochemistry functions.. A 1,000 square-foot building will be built at the Y-12 Plant for use in high-sensitivity analysis. It will consist of an airlocked, personnel monitoring station; two laboratories; and a counting room. At Rocky Flats, a 6,000 square-foot building will be built with a low-scatter cell for use in neutron and gamma calibrations.

The requested FY 1991 funding will be used for procurement of equipment and installation of radiation source handling systems and will complete the project.

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ATOMIC ENERGY DEFENSE ACTIVITIES
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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 88-D-126, Personnel Radiological Monitoring Laboratories, Various Locations

PROJECT TEC: $ 7,600
START DATE: 4th Qtr. FY 1988
COMPLETION DATE: 4th Qtr. FY 1991

4. Total Project Funding: (B/O)

	Prior Years	FY 1990	FY 1991 Request	To Complete
Construction	$ 893	$ 5,000	$ 1,707	$ 0
Capital Equipment	0	0	0	0
Operating Expenses	335	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 87-D-122, Short Range Attack Missile II (SRAM II)
Warhead Production Facilities,
Various Locations

PROJECT TEC: $76,200 a/
START DATE: 3rd Qtr. FY 1989
COMPLETION DATE: 4th Qtr. FY 1992

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1987	$ 984	$ 984	$ 140
1988	0	0	203
1989	26,000	26,000	4,584
1990	40,582	40,582	40,200
1991	8,634	8,634	21,300
1992	0	0	9,773

3. Narrative:

This project will provide new and modified building space, new and upgraded process systems, special facilities, and replacement or additional equipment needed for production, inspection, and certification of raw materials, components, subassemblies, and final assembly of the warhead currently proposed for the U.S. Air Force Short Range Attack Missile II (SRAM II). This system is currently in an early design stage and many uncertainties remain to be resolved before final design definition. Therefore, the total estimated cost includes an allowance for design and process uncertainties at the Kansas City and Rocky Flats Plants.

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 343	$ 4,584	$ 40,200	$21,300	$ 9,773
Capital Equipment	0	0	0	0	0
Operating Expenses	1,000	0	0	0	0

a/ TEC reflects $3M reduction in design uncertainty.

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ATOMIC ENERGY DEFENSE ACTIVITIES
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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 86-D-130, Tritium Loading Facility Replacement,
Savannah River Plant,
Aiken, South Carolina

PROJECT TEC: $144,000
START DATE: 1st Qtr. FY 1987
COMPLETION DATE: 1st Qtr. FY 1991

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1986	$ 4,700	$ 4,700	$ 3,944
1987	29,527	29,527	16,665
1988	43,948	43,948	40,674
1989	39,800 g/	39,800	46,609
1990	23,665	23,665	21,032
1991	2,360	2,360	15,076

3. Narrative:

This project will provide a new tritium reservoir loading facility consisting of a new subsurface reinforced concrete building, new process facilities, and "state-of-the-art" equipment needed to support the weapons production schedule in FY 1990 and beyond. Newly developed technology in metal hydride storage, pumping, compression, and separation of isotopes will be provided.

The purpose of this project is to replace poor and inadequate tritium reservoir loading facilities needed to support the weapon production schedule and stockpile maintenance in FY 1990 and beyond. Expansion of existing facilities is not practical due to physical limitations and the age of the process equipment. The combined effect of new equipment and technology will allow a 25 percent reassignment of current reservoir loading manpower requirements. Improved containment will result in virtual elimination of atmospheric releases from loading operations.

The FY 1991 funding will be used to continue process design, for equipment acquisition, and for construction.

g/ The FY 1989 appropriation includes $8,000,000 from the reprogramming of funds from prior year project underruns.

DEPARTMENT OF ENERGY
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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

CONSTRUCTION PROJECTS

Weapons Production and Surveillance

IV. B. Plant Funded Construction Project

1. Project 86-D-130, Tritium Loading Facility Replacement,
Savannah River Plant,
Aiken, South Carolina

PROJECT TEC: $144,000
START DATE: 1st Qtr. FY 1987
COMPLETION DATE: 1st Qtr. FY 1991

4. Total Project Funding: (B/O)

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$61,283	$46,609	$21,032	$15,076	$ 0
Capital Equipment	0	0	0	0	0
Operating Expenses	$17,280	0	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

LEAD TABLE

WEAPONS PROGRAM DIRECTION

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
Operating Expenses:						
Federal and Contractual Support						
Office of the Assistant Secretary for Defense Programs (ASDP)	$ 7,150 a/	$ 960	$ 960	$ 1,020	+60	+6
Deputy Assistant Secretary for Planning and Resource Management (DASPRM)	0 b/	18,694	18,694	21,024	+2,330	+12
Deputy Assistant Secretary for Military Application (DASMA)	6,605 c/	7,275	7,275	8,430	+1,155	+16
Albuquerque Operations Office	34,051	33,320 d/	33,320	34,685	+1,365	+4
Nevada Operations Office	10,470	10,290 h/	10,290	10,890	+600	+6
San Francisco Operations	1,765 g/	2,484 j/	2,484	2,700	+216	+9
Office of Security Evaluations	12,455 g/	13,322	13,322	14,155	+833	+6
Office of Emergency Operations	1,435	2,300	2,300	2,610	+310	+13
Subtotal	$ 73,931	$ 88,645	$ 88,645	$ 95,514	+6,869	+8
Albuquerque Operations Office						
Los Alamos Community Assistance Program	$ 9,234	$ 9,050	$ 9,050	9,201	+151	+2
Total Operating	$ 83,165	97,695 j/	$ 97,695	$104,715	$+7,020	+7
Capital Equipment						
Office of Security Evaluations	$ 0	$ 724	$ 724	500	-224	-31
Office of Emergency Operations	0	985	985	1,210	+225	+23
Subtotal Capital Equipment	$ 0	$ 1,709 k/	$ 1,709	$ 1,710	+1	-
Total Weapons Program Direction	$ 83,165	$ 99,404	$ 99,404	$106,425	+7,021	+7
Staffing (FTE's)	885 f/	929	929	939		

Footnotes for Weapons Program Direction Lead Table

Weapons Program Direction Lead Table excludes FY 1989 comparability adjustments to reflect the implementation of Defense Programs reorganization, effective March 21, 1988 (60 FTE's/$3,129,000; contractual support activities - $8,334,000).

a/ 3 FTE's/$291,000 realigned to Office of the Deputy Assistant Secretary for Planning and Resource Management (ODASPRM).

b/ Staffing: ASDP - 3 FTE's/$291,000; DASPA - 27 FTE's/$1,385,000; OSE - 1 FTE/$60,000; DMER - 8 FTE's/$391,000; MMP - 6 FTE's/$280,000; V&CT - 3 FTE's/$128,000; OSS - 8 FTE's/$377,000; OCTP - 3 FTE's/$128,000. Transferred $8,334,000 from the following Defense Programs offices for consolidation of Headquarters contractual support activities germane to all program offices: Weapons Research and Development - $1,700,000; Weapons Production and Surveillance - $2,521,000; Materials Production - $2,300,000; DMER - $1,092,000; V&CT - $274,000; and NSS - $447,000.

c/ 27 FTE's/$1,385,000 realigned to DASPRM; 1 FTE/$29,000 to OSS for foreign travel function; and $60,000 transferred to V&CT for special technologies support.

d/ $1,765,000/15 FTE's realigned from the Weapons Research and Development Program.

e/ 1 FTE/$60,000 realigned to DASPRM.

f/ Reflects transfer of 56 FTE's associated with Defense Waste and Environmental Restoration activities to the Office of Environmental Restoration and Waste Management.

g/ Reflects transfer of 12 FTE's associated with Defense Waste and Environmental Restoration activities to the Office of Environmental Restoration and Waste Management.

h/ $1,886,000/15 FTE's realigned from the Weapons Research and Development Program. 31 FTE's in support of Defense Programs activities transferred from Management and Administration.

i/ FY 1990 appropriation $97,903,000. Reflects sequesteration of $1,469,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177). Reflects transfer of $625,000 to the Office of Environmental Restoration and Waste Management. Includes $1,886,000 transferred from Weapons Research and Development for realignment of 15 FTE's at SAN.

j/ FY 1990 appropriation $1,735,000. Reflects sequesteration of $26,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177).

DEPARTMENT OF ENERGY
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SUMMARY OF CHANGES

Weapons Program Direction

FY 1990 Appropriation	$ 99,404
Adjustments	0
FY 1991 Base	$ 99,404
• Personnel-related expenses for 10 additional FTE's plus cost-of-living increases, Federal Medicare, FICA contributions, and travel for 929 FTE's in FY 1990	+3,583
• Provides for increased cost of contractual services including common support requirements for Headquarters that service all Defense Programs offices	+3,286
• Fully funds the Los Alamos Community Assistance Program based on contract formula adopted by the Department of Energy Working Group on Community Assistance	+151
• Provides capital equipment funds for OSE and OED	+1
FY 1991 Congressional Budget Request	$106,425

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

WEAPONS ACTIVITIES

I. Preface: Weapons Program Direction

Weapons Program Direction provides funds for personnel and contractual services related expenses for the following locations:

- Office of the Assistant Secretary for Defense Programs
- Deputy Assistant Secretary for Planning and Resource Management
- Deputy Assistant Secretary for Military Application
- Albuquerque Operations Office
- Nevada Operations Office
- San Francisco Operations Office
- Office of Security Evaluation
- Office of Emergency Operations

The Community Assistance Program at Los Alamos, New Mexico, is also funded from this account.

The mission, goals, and management responsibilities for each entity follow.

Office of the Assistant Secretary for Defense Programs

The Office of the Assistant Secretary for Defense Programs provides overall management direction and administration in support of our Nation's nuclear deterrent mission to assure that operations are conducted in the most efficient manner consistent with national security policies and objectives.

Office of the Deputy Assistant Secretary for Planning and Resource Management

The Office of the Deputy Assistant Secretary for Planning and Resource Management provides management control of Defense Programs resources; management of Defense Programs-wide long-range planning, institutional planning, and strategic issues analysis; financial management coordination of Defense Programs-wide budget formulation, financial management, program review and analysis, and project management activities; and management support of Defense Programs-wide management and administrative support activities.

Office of the Deputy Assistant Secretary for Military Application

Management functions in support of the overall objectives of the weapons program and the inertial fusion program include program management, direction, and support; development of program goals and objectives; monitoring, evaluation, and approval of mainline research efforts of the weapons laboratories; formulation and presentation of plans and budgets for program accomplishments; management of the nuclear weapons complex; and execution of plans and directives for development and production of nuclear weapons.

Albuquerque Operations Office

The Albuquerque Operations Office's primary goal is the effective management and oversight of the weapons research, development, and production programs at the Sandia National Laboratories, the Los Alamos National Laboratory, and five weapons production contractors. The Albuquerque Office also provides programmatic guidance relative to production and surveillance activities to the Oak Ridge and Savannah River Operations Offices and coordinates and integrates weapons program activities with the Lawrence Livermore National Laboratory.

Major objectives continue to be: the successful execution, through Federal personnel and contracting, of assigned programs for manufacturing quality assurance, safety, and transportation of nuclear weapons; the planning, scheduling, distribution, and transportation of all shipments of Government-owned strategic quantities of special nuclear materials and other toxic nuclear materials not related to the weapons program and not covered by Nuclear Regulatory Commission license; and other assigned nonweapons and reimbursable program activities.

Management of the Waste Isolation Pilot Plant and the Uranium Mill Tailings Remedial Actions Programs has been transfered to the Office of Environmental Restoration and Waste Management.

Nevada Operations Office

The Nevada Operations Office's primary goal is the effective management and oversight of the underground nuclear testing portion of the Weapons Research, Development, and Test Program. An integral part of this activity is the coordination and integration of the Weapons Test Program activities at the Nevada Test Site through six major contractors and two Federal agencies, with the participation of the three national laboratories consisting of the Sandia National Laboratories, the Los Alamos National Laboratory, and the Lawrence Livermore National Laboratory in assigned portions of the Weapons Test Program. The safe transport of nuclear devices involved in each event at NTS and the effective management of all other assigned programs and project activities, including energy and nonweapons programs, are also a major part of the Weapons Program activities. The Nevada Operations Office also supports the safeguards and security readiness program at Johnston Atoll.

Major objectives continue to be: the conduct of all nuclear explosive testing operations and other weapons-related activities in a manner which maximizes public safety in the achievement of scientific objectives; management of the scientific and technical resources necessary to respond to nuclear incidents and test treaty verification protocols including the Joint Verification Experiments; and conduct of other high-technology research, development, and demonstration programs, including Special Technologies and Emergency Response.

San Francisco Operations Office

The primary goal of the Defense Programs mission at the San Francisco Operations Office is the effective management and oversight of Weapons Research, Development, and Testing, and the Materials Production research and development programs at the Lawrence Livermore National Laboratory. The SAN office also provides institutional management of the LLNL Site and Site 300. Major objectives continue to be the successful execution, through Federal personnel and contracting of assigned weapons programs for safe and efficient operations of LLNL facilities; providing input into the budget cycle modernization/planning to assure the weapons complex viability; and management/control of the reimbursable programs. Other key SAN functions include safeguards and security activities, classification activities, arms control oversight, verification activities, technology transfer, counterintelligence, and export control functions.

Office of Security Evaluations

The Office of Security Evaluations (OSE) is responsible for inspecting and assessing the effectiveness of the Department of Energy's safeguards and security policies, programs, and their implementation in the field; and for the safety certification of packages for shipment of DOE's radioactive materials. Safeguards and security inspections are conducted at field sites to assure that national security, public safety, and program operations are adequately protected. Management-level evaluations of the effectiveness of protection policies and programs are also conducted. Packaging certification reviews are conducted to assure that public health and safety are adequately protected during the shipment of the Department of Energy's radioactive materials, and a technology base is maintained for these activities. Contractor and laboratory staff augment the OSE staff in safeguards and security and packaging certification activities.

Office of Emergency Operations

The Office of Emergency Operations is the focal point of contact for all emergency preparedness activities of the Department of Energy. These activities include planning, development, testing, and utilization of the Department's Emergency Management System; guidance and oversight of emergency management programs and facilities; managing the flow of emergency information and maintaining a readiness assurance program; and assisting in the organization and training of Headquarters personnel involved in emergency response. The Office of Emergency Operations also assists in the management of the Department's emergency exercise program and manages and operates the Headquarters Emergency Operations Center.

Community Assistance Program

The Department of Energy administers the Community Assistance Program under Section 91 of Public Law 94-187, the Atomic Energy Community Act of 1955, as amended, to provide assistance to specified units of local government in the Los Alamos community associated with the Los Alamos National Laboratory. The purpose of the assistance is to: (a) compensate for the lack of an industrial or commercial tax base, and (b) assist in achieving financial independence. Effective July 1, 1987, the Department of Energy entered into contracts with the Los Alamos County and the Los Alamos County School Board, which extend through June 30, 1996, in accordance with DOE's authority to contract for such assistance. The contracts utilize the funding formula adopted in 1979 by the Department of Energy Working Group on Community Assistance and include updated base amounts to which the formulas are applied.

Weapons Program Direction

II. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Operating Expenses:				
1. Federal and Contractual Support				
a. Office of the Assistant Secretary for Defense Programs (ASDP)	$ 7,150	$ 940	$ 1,020	+6
b. Deputy Assistant Secretary for Planning and Resource Management (DASPRM)	0	18,696	21,024	+12
c. Deputy Assistant Secretary for Military Application (DASMA)	6,605	7,275	8,430	+16
d. Albuquerque Operations Office	34,051	33,320	34,685	+4
e. Nevada Operations Office	10,470	10,290	10,890	+6
f. San Francisco Operations Office	1,765	2,484	2,700	+9
f. Office of Security Evaluations	12,455	13,322	14,155	+6
g. Office of Emergency Operations	1,435	2,300	2,610	+13
Subtotal	$ 73,931	$ 88,645	$ 95,514	+8
2. Community Assistance				
Albuquerque Operations Office	$ 9,234	$ 9,050	$ 9,201	+2
Total Operating Expenses	$ 83,165	$ 97,695	$104,715	+7
Capital Equipment				
Office of Security Evaluations	$ 0	$ 724	$ 500	-31
Office of Emergency Operations	0	985	1,210	+23
Total Capital Equipment	$ 0	$ 1,709	$ 1,710	-
Total Weapons Program Direction	$ 83,165	$ 99,404	$106,425	+7

II. B. Major Laboratory and Facility Funding

Not applicable.

III. Weapons Program Direction

Program Activity	FY 1989	FY 1990	FY 1991
Operating Expenses			
Office of the Assistant Secretary for Defense Programs			
Funding by Object Class			
Salaries and other Personnel Compensation	$ 3,490	$ 784	$ 834
Benefits	495	104	110
Travel	285	72	76
Contractual Services	2,880	0	0
Total	$ 7,150	$ 960	$ 1,020
	Continues activities related to the overall management of the DOE's Defense Programs. Increased funding provides for personnel-related expenses including cost-of-living increases, Federal Medicare and FICA contributions, and health benefits contributions.	Provides for a staff of 12 FTE's to carry out activities related to the overall management of the DOE's Defense Programs with associated increases for cost-of-living, Federal Medicare and FICA contributions, and health benefits contributions.	Continues FY 1990 staffing level.
	(Non-add - Comparability adjustment of 37 FTE's/$3,338,000 and $2,880,000 contractual services funding transferred to CDASPRM. Effective in FY 1990.)	Three FTE's transferred to the Office of Nuclear Self-Assessment (DASPRM) to continue effective ES&H program oversight.	Provides increased funding for cost-of-living, Federal Medicare and FICA contributions, and health benefit contributions.
	$ 7,150/53 FTE's	$ 960/12 FTE's	$ 1,020/12 FTE's

III. Weapons Program Direction

Program Activity	FY 1989	FY 1990	FY 1991
Office of the Deputy Assistant Secretary for Planning and Resource Management			
Funding by Object Class			
Salaries and Other Personnel Compensation	$ 0	$ 6,550	$ 6,875
Benefits	0	857	906
Travel	0	398	416
Contractual Services	0	10,889	12,827
Total	$ 0	$18,694	$21,024

No funds appropriated for this office in FY 1989.

On March 21, 1988, a reorganization of DOE's Defense Programs offices was implemented that consolidated management of resources, long-range planning, and administrative activities under the direction of the Deputy Assistant Secretary for Planning and Resource Management. The necessary staffing and funding required to carry out the assigned responsibilities were transferred from other Defense Programs offices. In addition, funding for contractual support activities germane to all Defense Programs offices were also transferred. The following table summarizes funding and FTE requirements.

	FTE's	FY 1989
Transferred from Other DP Offices	29	$ 1,393
Contractual Services Support from Other DP Offices		8,334
Internal Adjustments within this Decision Unit	65	$ 7,572
TOTAL	94	$17,299

The Activity Descriptions which follow coincide with the mission of the office.

Provided support that encompassed the management and coordination of DP-wide budget, financial management, and project management. Supported administrative activities that included organization, procurement, internal controls, ADP, MIS, office automation, and management directives.

Contractual services funding consolidated Defense Programs support services contracts into one centralized area of funding.

Provides 102 FTE's for increased support for programs in areas such as budget, program planning, financial management, project management, and supporting administrative functions resulting from the added requirements of Secretary of Energy Notices 6/6A.

Provides 15 FTE's for the Office of Nuclear Self-Assessment, established to implement SEN-6A to ensure line organizational assumption of total responsibility and

Continues FY 1990 staffing level with one additional FTE requested for the Office of Nuclear Self-Assessment. Provides for cost-of-living, Federal Medicare and FICA contributions, and health benefits contributions.

Provides funding increases for cost-of-living, Federal Medicare and FICA contributions, and health benefits contributions.

III. Weapons Program Direction

Program Activity	FY 1989	FY 1990	FY 1991
		accountability for programs, including environment, safety, and health responsibilities. Provides for internal oversight for nuclear safety and to perform independent design, construction, and operational evaluation for nuclear facility safety. Provides funding increases for cost-of-living, Federal Medicare and FICA contributions, and health benefits contributions. Includes funding for ADSS workstation support for Defense Programs offices, estimated to cost $1.1 million. Provides $1.5 million for DOE's Satellite-Based Communications System, used to link Field Operations Offices with Headquarters. Contractual services funding provides for independent analysis of program management and project performance. Continues the consolidation of Defense Programs support services contracts into one centralized area of funding. Effective in FY 1990.	Increased contractual services funding is required to continue the funding of recurring support services that were transferred from other Defense Programs offices. In addition, increased funding is required for Secretarial Environmental Assessment Teams, ongoing BAS oversight, implementation of the Modernization Study, and other Secretarial-directed initiatives. Supports Secretarial initiative to provide extensive technical training for program managers.
	$ 0/0 FTE's	$ 18,694/117 FTE's	$ 21,024/118 FTE's

III. Weapons Program Direction

Program Activity	FY 1989	FY 1990	FY 1991
Deputy Assistant Secretary for Military Application			
Funding by Object Class			
Salaries and Other Personnel Compensation	$ 5,258	$ 5,796	$ 6,580
Benefits	647	827	830
Travel	700	650	720
Contractual Services	0	0	300
Total	$ 6,605	$ 7,275	$ 8,430
	Provided program management, direction, and support of those programs related to accomplishing the Weapons Activities mission. Increased funding provides for personnel-related expenses including cost-of-living increases, Federal Medicare and FICA contributions, and health benefits contributions. (Non-add - Comparability adjustments of FTE's and associated funding to reflect the DP reorganization: o 27 FTE's/$1,385,000 to CDASPRM o 1 FTE/$29,000 to OBS o $60,000 to VECT)	Continues to meet the overall objectives and support those programs related to accomplishing the Weapons Activities mission. Provides for an increase of 20 FTE's for the implementation of SEN-6/6A and other requirements, i.e., engineering expertise in nuclear weapons safety to cover adequately the expanded DOE oversight responsibilities required by NSDD-309; assure compliance with Federal (RCRA, CERCLA, and NEPA), State and Departmental environmental requirements; and scientific and engineering expertise needed for weapons safety and health compliance and management in nuclear safety, transportation safety, emergency management, and training programs.	A staffing level of 105 FTE's is required to meet line responsibilities for ES&H oversight and programmatic responsibilities; to assure weapons production levels for the weapons complex to meet U.S. Defense requirements (Nuclear Weapons Stockpile Memorandum); and to meet requirements associated with Secretarial initiatives as directed in SEN-6/6A. Provides for personnel-related expenses including cost-of-living increases, Federal Medicare and FICA contributions, and health benefits contributions. Contractual services funding is required for graphics, printing, and support services.

III. Weapons Program Direction

Program Activity	FY 1989	FY 1990	FY 1991
		Funding is included for personnel-related expenses including cost-of-living increases, Federal Medicare and FICA contributions, and health benefits contributions.	
Albuquerque Operations Office	$ 6,605/100 FTE's	$ 7,275/96 FTE's	$ 8,430/105 FTE's
Funding by Object Class			
Salaries and Other Personnel Compensation	$ 20,232	$ 19,058	$ 20,267
Benefits	3,015	2,875	2,985
Travel	1,700	1,590	1,658
Contractual Services	9,104	9,797	9,775
Total	$ 34,051	$ 33,320	$ 34,685
	Carried out the effective management and oversight of the weapons research, development, and production programs at the two national laboratories and the weapons production complex.	Continues to meet the responsibilities associated with the successful execution of assigned programs for manufacturing, quality assurance, safety, and transportation of nuclear weapons.	Continues FY 1990 level of effort with funding for personnel-related expenses including cost-of-living increases, Federal Medicare and FICA contributions, and health benefits contributions.
	Managed assigned energy-related and nonweapons programs.	Continues management of assigned energy-related and nonweapons programs.	Funding included for communications and utilities costs; and all other supplies, materials, and services.
		Defense waste and environmental restoration activities and related FTE's at DP Headquarters and dedicated DP field offices were transferred from the Assistant Secretary for Defense Programs to the newly established Office of Environmental Restoration and Waste Management. Accordingly, 56 FTE's are transferred to that office.	

III. Weapons Program Direction

Program Activity	FY 1989	FY 1990	FY 1991
		Provides for personnel-related expenses including cost-of-living increases, Federal Medicare and FICA contributions, and health benefits contributions; communications and utilities costs; and all other supplies, materials, and services. Support services such as the mail and records services, plant and vehicle maintenance, ground maintenance, janitorial services, and the security escort service have been contracted out.	
Subtotal, AL Operations Office	$ 34,051/522 FTE's	$ 33,320/471 FTE's	$ 34,685/471 FTE's

III. Weapons Program Direction

Program Activity	FY 1989	FY 1990	FY 1991
Nevada Operations Office			
Funding by Object Class			
Salaries and Other Personnel Compensation	$ 6,373	$ 6,295	$ 6,785
Benefits	1,120	1,065	1,100
Travel	382	365	405
Contractual Services	2,595	2,567	2,600
Total	$ 10,470	$ 10,290	$ 10,890
	Continued the management and oversight of the Nevada Test Site. Provided support for the safeguards and security readiness program at Johnston Atoll.	Continues to meet nuclear weapons test program and other high technology research and development objectives. Defense waste and environmental restoration activities and related FTE's at DP Headquarters and dedicated DP field offices were transferred from the Assistant Secretary for Defense Programs to the newly established Assistant Secretary for Environmental Restoration and Waste Management. Accordingly, 12 FTE's are transferred to that office.	Continues FY 1990 staffing level. Provides for personnel-related expenses including cost-of-living increases, Federal Medicare and FICA contributions, and health benefits contributions. Continues contractor support activities.
	$ 10,470/155 FTE's	$ 10,290/147 FTE's	$10,890/147 FTE's

III. Weapons Program Direction

Program Activity	FY 1989	FY 1990	FY 1991
San Francisco Operations Office			
Funding by Object Class			
Salaries and Other			
Personnel Compensation	$ 870	$ 1,969	$ 2,114
Benefits	80	215	249
Travel	230	300	337
Contractual Services	585	0	0
Total	$ 1,765	$ 2,484	$ 2,700
	Carried out the effective management and oversight of Weapons Research, Development, and Testing, and Materials Production research and development programs at the Lawrence Livermore National Laboratory. Also provided institutional management of the LLNL Site and Site 300.	Continues to meet responsibilities associated with the management and oversight of LLNL. The increased staff supports additional safeguards and security activities and continues improved oversight of LLNL operations.	Continues FY 1990 level of effort. Provides increased funding for cost-of-living, Federal Medicare, and FICA contributions, and health benefit contributions.
Subtotal, San Francisco Operations Office	$1,765/15 FTE'S	$2,484/46 FTE's	$2,700/46 FTE's
Office of Security Evaluations			
Funding by Object Class			
Salaries and Other			
Personnel Compensation	$ 1,611	$ 1,701	$ 1,791
Benefits	225	242	279
Travel	408	524	455
Contractual Services	10,211	10,855	11,630
Total	$ 12,455	$ 13,322	$ 14,155

III. Weapons Program Direction

Program Activity	FY 1989	FY 1990	FY 1991
Office of Security Evaluations	Provided for Federal staffing and contractual support to perform the following activities: Inspections: Inspected 12 key facilities. Updated inspector handbook to be consistent with new policies issued in FY 1988. Assessments: Performed assessments of the status of 8 protection program topics, 8 evaluations of specific subject areas, and 8 methodology development tasks. RAMPAC: Continued to process the 26 packaging certification dockets. Continued to examine existing packaging designs for possible replacement or modification. Management Support: Established a centralized file system and an internal control system to enhance management control of OSE processes. Maintained the minimal data base support developed previously.	Provides for Federal staffing and contractual support to perform the following activities: Inspections: Perform 12 inspections of key facilities; update inspector handbook as required. Assessments: Provide assessments of the status of 6 protection program topics. Six special studies, 2 handbooks, 3 performance tools, 1 set of system performance tools, and 1 special assessment. RAMPAC: Continue to process existing packaging certification dockets. Continue to examine existing designs. Backlog of applications to be processed is expected to grow during FY 1990 under approved funding/FTE level. Management Support: Continues the initiatives of FY 1989. The increased contractual services are required to provide additional specialized topical expertise to accommodate the increase in sophistication of the field systems being inspected.	Continues at FY 1990 level of effort. Increased funding is required for cost-of-living increases, Federal Medicare and FICA contributions, and health benefits contributions. Additional contractual effort is required to deal with increasing RAMPAC workload and increasing sophistication of inspected safeguards and security systems.
Subtotal, Office of Security Evaluations	$ 12,455/27 FTE's	$13,322/26 FTE's	$14,135/26 FTE's

III. Weapons Program Direction

Program Activity	FY 1989	FY 1990	FY 1991
Office of Emergency Operations			
Funding by Object Class			
Salaries and Other Personnel Compensation	$ 605	$ 686	$ 720
Benefits	90	100	105
Travel	25	26	35
Contractual Services	715	1,488	1,750
Total	$ 1,435	$ 2,300	$ 2,610
	Continued the operation of the expanded Energy Management System initiated in FY 1986. Provided greater readiness assurance through improved planning management and assistance, improved training and evaluation capabilities, and expanded management support system capabilities.	As a result of an extensive study of the requirements for and the design of an improved Emergency Operations Center, provides $807,000 for building alterations on the ground floor of the Forrestal Building.	Continues FY 1990 level of effort.
	Enhanced capabilities provided through contractual support in emergency plans development, readiness assurance system design and development, management support systems design and integration, support services during emergencies, and various subscriber services.	An FTE level of 14 will help meet emergency preparedness commitments for ensuring complete and consistent planning and Departmental readiness for effective emergency response.	Provides for personnel-related expenses including cost-of-living increases, Federal Medicare and FICA contributions, and health benefits contributions.
Subtotal, Office of Emergency Operations	$ 1,435/13 FTE's	$ 2,300/14 FTE's	$ 2,610/14 FTE's

III. Weapons Program Direction

Program Activity	FY 1989	FY 1990	FY 1991
Community Assistance Program			
Albuquerque Operations Office			
Civic Activities	$ 30	$ 30	$ 30
Los Alamos County			
Assistance Payments to Municipalities	2,704	2,541	2,588
Assistance Payments to Schools	6,500	6,459	6,583
Total	$ 9,234	$ 9,050	$ 9,201
	Based on the provisions of the Atomic Energy Community Act of 1955, supported the DOE's obligations under assistance contracts with Los Alamos County for Civic Activities, and assistance payments to the County and to the schools. Reflected the full impact of the new contracts with the Los Alamos County and the School Board. The contracts included revised base amounts in their formula, implicit price deflator factors, and factors for changes in employment and school enrollment.	Fully supports the Los Alamos Community Assistance Program as defined in Section 91 of Public Law 96-187, the Atomic Energy Act of 1955, as amended. The decrease in the Community Assistance Program between FY 1989 and FY 1990 is attributed to the decrease in student enrollment in Los Alamos schools and the decrease of employees at the Los Alamos National Laboratory.	Fully supports the Los Alamos Community Assistance Program as defined in Section 91 of Public Law 96-187, the Atomic Energy Community Act of 1955, as amended.
Subtotal, Community Assistance Program	$ 9,234	$ 9,050	$ 9,201
Subtotal, Operating	$83,165/885 FTE's	$97,695/929 FTE's	$104,715/939 FTE's

III. Weapons Program Direction

Program Activity	FY 1989	FY 1990	FY 1991
Capital Equipment			
Office of Emergency Operations	No activity.	Provides for communications, display, and data processing equipment in the improved Emergency Operations Center.	Provides additional state-of-the-art communication, display, and data processing equipment in the improved Emergency Operations Center.
Subtotal, Office of Emergency Operations	$ 0	$ 985	$ 1,210
Office of Security Evaluations	No activity.	Purchase equipment to perform computer security and technical security. Provide information resource management hardware (including TEMPEST-approved microcomputers) to support CDE inspection and evaluation activities in the field and at Headquarters.	Complete purchase of equipment to perform computer security and technical inspections and evaluations.
Subtotal, Office of Security Evaluations	$ 0	$ 724	$ 500
Subtotal, Capital Equipment	$ 0	$ 1,709	$ 1,710
TOTAL WEAPONS PROGRAM DIRECTION	$83,165/885 FTE's	$89,404/929 FTE's	$106,425/939 FTE's

VOLUME 1

NUCLEAR MATERIALS PRODUCTION

14C

DEPARTMENT OF ENERGY

FY 1991 CONGRESSIONAL BUDGET REQUEST

ATOMIC ENERGY DEFENSE ACTIVITIES

VOLUME 1

NUCLEAR MATERIALS PRODUCTION

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OVERVIEW

Nuclear Materials Production

Program Mission

The principal mission of the Nuclear Materials Production program is to provide nuclear materials to meet national defense requirements. Fundamental to meeting that mission is the maintenance of a safe, reliable, production complex capable of responding to changing demands. The principal nuclear materials required in support of the nation's nuclear weapons program are tritium, plutonium and enriched uranium. Specific requirements for these materials are defined in the Nuclear Weapons Stockpile Memorandum, updated and approved by the President annually. The requirements forecast in the stockpile memorandum are developed by the Department of Defense in conjunction with the Department of Energy.

In addition to the primary mission of providing nuclear materials for national defense, the Nuclear Materials Production program also produces and provides nuclear materials for use in Government research and development activities and in civilian research, commercial and medical applications. The program provides highly enriched uranium in the form of metal or oxide for nuclear fuel fabrication for DOE and domestic and foreign research and test reactors; byproduct isotopes such as californium-252, americium-241, krypton-85 and cobalt-60 to DOE's isotope sales pool for commercial and medical uses; and other isotopes such as plutonium-238 for the National Aeronautics and Space Administration's space program. Additionally, spent fuels from the Navy's nuclear propulsion reactors and from research reactors are processed and the recovered uranium is recycled into DOE production reactors.

Program Overview

Material demands are met from existing inventories, new production, purification of process residues, and purchase of uranium enrichment services from the DOE Office of Uranium Enrichment. To meet demands for new production, NMP operates a complex of feed materials and fuel fabrication facilities, production reactors and processing plants at the Savannah River Plant, Aiken, South Carolina; the Hanford site, Richland, Washington; the Idaho National Engineering Laboratory, Idaho Falls, Idaho; the Y-12 Plant, Oak Ridge, Tennessee; the Feed Materials Production Center, Fernald, Ohio; and the Los Alamos National Laboratory, Los Alamos, New Mexico. The production reactors operated by NMP are the nation's only source of new plutonium and tritium for defense applications.

Most of the facilities in the complex were built to much less stringent environmental and safety regulations in the 1950's and early 1960's in reaction to World War II and the Cold War. In the 1970's, some of these facilities were neglected and many were shut down. Meanwhile, the commercial nuclear industry was learning much about the potential effects of its operation on workers and the public, and making physical and procedural changes to incorporate this increased knowledge. NMP now faces the challenge of maintaining the capability and reliability of our existing facilities while planning and implementing the modernization of the complex to insure the future.

At this time the Nuclear Materials Production program is not producing any new tritium or plutonium in its production reactors. The reactors are currently not operating so that improvements can be made to reactor hardware, procedures, training management systems and practices and maintenance to assure future safe operation. Many of these improvements are not one-time activities, but will require a sustained high level of funding for as long as the reactors are expected to operate. Past budget restrictions, coupled with the need to continue to operate facilities that were designed and built over 35 years ago, have led to a backlog of maintenance upgrades and operational improvements that need to be addressed. The program's first priority is to resume reactor production of tritium as soon as improvements can be made to insure the continued safe and reliable operation of the reactors.

The primary driver for additional funding is the reactor restart effort at the Savannah River Site. This is the number one priority of the Nuclear Materials Production program. Additional funding is also required for improvements similar to those required in reactor operation for Nuclear Materials Production's nonreactor facilities.

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(dollars in thousands)

LEAD TABLE

Nuclear Materials Production

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Operating Expenses:						
Reactor Operations	$ 620,028a/	$ 686,099	$ 686,099	$ 811,457	$ 125,358	18%
Processing	399,621	467,860	467,860	562,469	108,609	20%
Special Isotope Separation	78,019	75,410	75,410	66,500	(8,910)	-12%
Supporting Services	257,959b/	232,728	232,728	302,043	75,315	36%
Program Direction	32,403c/	34,736	34,736	42,500	7,764	22%
Enriched Material	149,000	146,366	146,366	176,901	(9,465)	-6%
Subtotal, Operating Expenses	1,537,030	1,643,199	1,643,199	1,961,870	298,671	18%
Capital Equipment	96,281	100,544	100,544	185,622	5,078	3%
Construction	289,397	328,581	328,581	345,508	16,927	5%
Total, Nuclear Materials Production	$ 1,942,708	$ 2,092,324	$ 2,092,324	$ 2,413,000	$ 320,676	15%
Staffing (FTE's)	408	506	506	526		
Savannah River	351	343d/	343d/	343		
Idaho	10	14	14	14		
Oak Ridge	-	20	20	20		
Richland	-	29	29	29		
Headquarters	47	101	101	121		

Footnotes for Nuclear Materials Production Lead Table

a/ Does not reflect comparability adjustment of $1,000,000 from Nuclear Materials Production Program Direction to Weapons Program Direction as a result of Defense Programs' reorganization.

b/ Does not reflect comparability adjustment of $1,300,000 from Nuclear Materials Production Program Direction to Weapons Program Direction as a result of Defense Programs' reorganization.

c/ Does not reflect comparability adjustment for transfer of $280,000 to Weapons Program Direction for six FTE's and for consolidation of Headquarters contractual support activities germane to all program offices.

d/ Assumes a transfer of 40 full time equivalent's from the Materials Production program to the Office of Environmental Restoration and Waste Management at the Savannah River Operations Office.

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RECONCILIATION OF LEAD TABLE TO APPROPRIATION

FY 1989

	Appropriation	Reprogrammings: NPR Transfers	Reprogrammings: Savannah River	Reprogrammings: Special Isotope Separation	Reprogrammings: Security Reinvest. Transfers	Reprogrammings: Defense Nuclear Safety Board Transfer	Reprogrammings: Fuel Production Facility	Comparabilities: Environmental Management Transfers	Comparabilities: Congressional Submission
Materials Production									
Operating Expenses									
Reactor Operations	$ 587,976	$(25,000)	$ 86,200	$ 0	$ (1,500)	$ (2,000)	$ (9,700)	$ (15,948)	$ 620,028
Processing	439,417	0	(5,000)	0	(200)	0	0	(34,596)	399,621
SIS	72,300	0	0	6,300	0	0	0	(581)	78,019
Supporting Services	259,679	0	53,800	0	(489)	0	0	(55,031)	257,959
Program Direction	28,400	0	4,003	0	0	0	0	0	32,403
Enriched Material	169,000	0	0	0	0	0	0	0	169,000
Subtotal Operating	1,556,772	(25,000)	139,003	6,300	(2,189)	(2,000)	(9,700)	(106,156)	1,557,030
Capital Equipment	102,500	0	(3,809)	(700)	0	0	0	(1,710)	96,281
Construction	326,587	(35,000)	18,300	(5,600)	0	0	9,700	(24,590)	289,397
Total	$ 1,985,859	$(60,000)	$153,494	$ 0	$ (2,189)	$ (2,000)	$ 0	$(132,456)	$ 1,942,708

FY 1990

	Appropriation	Environmental Management Transfers	Deficit Reduction Adjustment b/	Congressional Submission
Materials Production				
Operating Expenses				
Reactor Operations	$ 713,049a/	$ (18,558)	$ (8,392)	$ 686,099
Processing	510,865	(35,880)	(7,125)	467,860
SIS	78,744	(2,185)	(1,149)	75,410
Supporting Services	282,868	(46,596)	(3,544)	232,728
Program Direction	35,265	0	(529)	34,736
Enriched Material	148,900	0	(2,534)	146,366
Subtotal Operating	1,769,691	(103,219)	(23,273)	1,643,199
Capital Equipment	104,425	(2,350)	(1,531)	100,544
Construction	399,458	(65,873)	(5,084)	328,501
Total	$ 2,293,574	$ (171,442)	$ (29,888)	$ 2,092,324

a/ Includes $135,000,000 appropriation transfer from the Department of Defense, pursuant to the National Defense Authorization Act for fiscal years 1990-1991, Public Law 101-189.
b/ Reflects sequestration to comply with the Balanced Budget and Emergency Deficit Control Act of 1985, Public Law 99-177.

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(dollars in thousands)

SUMMARY OF CHANGES

Nuclear Materials Production

FY 1990 Appropriation	$1,957,324
Adjustments	
· Transfer appropriation from the Department of Defense to the Department of Energy	+ 135,000
FY 1991 Base	$2,092,324
Operating Expenses	
· Inflation	$+ 69,854
· Increase at Savannah River for reactor restart activities	+ 133,683
· Increase at SRS for processing activities	+ 87,339
· Decrease at San Francisco and Idaho to reflect orderly phaseout of the Special Isotope Separation Program	- 12,077
· Increase at Oak Ridge for Naval Reactors requirements for uranium enrichment services	+ 3,548
· Increase at Savannah River, Idaho, and Headquarters due to shift in FTE's from Departmental Administration to Nuclear Materials Production	+ 6,305
· Increase primarily in operating expenses at various locations for feed materials production, production, processing requirements, support costs, etc.	+ 10,046
Subtotal, Operating Expenses	$+ 298,671
Capital Equipment	
· Inflation	$+ 4,223
· Net increase at various locations	+ 855
Subtotal, Capital Equipment	$+ 5,078

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Construction

• Inflation (OPP)	$+	1,306
• Net increase in OPP primarily at Savannah River for reactor restart activities and safeguards and security initiatives	+	3,405
• Net increase primarily to environmental, safety, and health projects to comply with Departmental, State and other federal regulations	+	55,624
• Increase to support Fuel Production Facility which had been interrupted to examine scope and mission	+	8,481
• Decrease in project 86-D-148, Special Isotope Separation (SIS), reflecting orderly phaseout of this project in FY 1990	-	39,400
• Increase for continuation of Idaho Restoration Project (85-D-139)	+	13,625
• Net decrease in Productivity Retention Project, 86-D-149, primarily at Oak Ridge, due to transition of PROC from production operations to clean up activities	-	18,803
• Net decrease in Safeguards and Security projects	-	9,256
• Net decrease of Savannah River programmatic projects in support of reactor restart activities	-	2,975
Subtotal, Construction	+	14,997
FY 1991 Congressional Budget Request		42,413,000

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DEPARTMENT OF ENERGY
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KEY ACTIVITY SUMMARY

NUCLEAR MATERIALS PRODUCTION

I. Preface: Reactor Operations

The Reactor Operations portion of the Nuclear Materials Production budget includes production reactor feed plants at Fernald, Ohio, and Oak Ridge, Tennessee; an extrusion facility at Ashtabula, Ohio; and production reactors and fuel and target fabrication facilities at the Savannah River Site.

The only sources of new tritium and new plutonium for the weapons program are three nuclear production reactors (P, K, and L) located at the Savannah River Site. None of these reactors are presently operating due to management concerns. Subsequent to events associated with the restart of P Reactor in August 1988, major safety enhancements have been mandated for all three Savannah River Site reactors before they are restarted. Four principal reactor improvement objectives have been identified: design bases and systems performance; human performance; management systems and practices; and DOE onsite technical vigilance and oversight. The restart program includes design and operational requirements similar to practices traditionally applied to commercial nuclear power plants.

The restart strategy focuses on achieving the maximum assurance that the reactors can be operated safely. A course of action has been identified that entails both near-term actions, to be completed prior to restart, and long-term actions, to assure the continued safe and reliable operation of the Savannah River Site reactors. A specific plan and schedule for the restart of these reactors is to be approved by the Secretary.

The current schedule is to have the N Reactor at Hanford placed in cold standby by the end of FY 1990. There is no funding in this budget for the conversion or operation of N Reactor for tritium production.

The Office of Nuclear Materials Production is taking a hard look at the future mission of the Feed Materials Production Center (FMPC) located at Fernald, Ohio. The FMPC has supplied slightly enriched and depleted uranium for use in our production reactors and weapons production since the early 1950's. With the decision to place the N Reactor in standby, and an associated decision to consider that reactor only as a tritium contingency rather than a plutonium producer, the FMPC was instructed to shut down all facilities required solely for slightly enriched uranium metal production. A vendor qualification program has been initiated to identify and qualify commercial sources of depleted uranium for use in weapons components. This qualification effort is expected to result in contracts in mid-1991 for outyear requirements for depleted uranium. While there is optimism regarding the success of the vendor qualification program, there are no guarantees and the Department of Defense must also successfully complete its own vendor qualification program for product produced directly for them. These facilities must be maintained in an operable status until the vendor qualification program is successfully completed.

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II. A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request	% Change
Nuclear Criticality Facility	$ 1,058	$ 1,091	$ 1,519	39%
Safety Reviews	3,610	2,919	2,900	-1%
Feed Materials	69,452	54,058	67,970	26%
Fuel and Target Fabrication	75,600	79,144	80,500	2%
Irradiation	470,308	548,887	658,568	20%
Total, Reactor Operations	$ 620,028	$ 686,099	$ 811,457	18%

II. B. Major Laboratory and Facility Funding

Los Alamos National Laboratory	$ 4,668	$ 4,010	$ 4,419	10%
Feed Materials Production Center (FMPC)	62,075	44,567	55,930	25%
Westinghouse Savannah River Company	431,236	575,251	733,068	27%
Westinghouse Hanford Company	101,469	46,284	0	-100%
Pacific Northwest Laboratories-Batelle	75	0	0	0%
Martin Marietta (Y-12)	7,377	9,491	12,040	27%
Idaho National Engineering Laboratory	10,473	0	0	0%
Germantown-Headquarters	2,655	6,516	6,000	-8%

III. Activity Description: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Reactor Operations			
Nuclear Criticality Facility (Albuquerque)	Evaluated a wide variety of materials for criticality control, developed measurement techniques, and evaluated critical masses of fissile material at Los Alamos Critical Experiment Facility (LACEF).	Continues support of technical work related to development, assessment and evaluation of criticality safety and neutron physics experiments at LACEF.	Continues support of technical work related to development, assessment and evaluation of criticality safety and neutron physics experiments in LACEF.
Subtotal, Nuclear Criticality Facility	$ 1,058	$ 1,091	$ 1,519
Reactor Safety Reviews (Albuquerque)	Performed independent reactor safety review activities at Los Alamos National Laboratory including power	Continue performing independent reactor safety review activities at Los Alamos National Laboratory. Specific studies	Continue performing independent reactor safety review activities at Los Alamos National Laboratory. Specific studies

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III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Albuquerque) (cont'd)	limits, SRS emergency cooling system, SRL primary boundary integrity and SRS incident data base.	will be determined prior to fiscal year.	will be determined prior to fiscal year.
Subtotal, Safety Reviews	$ 3,610	$ 2,919	$ 2,900
Feed Materials (Oak Ridge)	Slightly Enriched Uranium (SEU) (N Reactor) support facilities at FMPC remained in cold standby condition. Environmental and radiological monitoring, site maintenance activities, and T-Hopper refurbishment for UO_3 storage continued. Minimal Configuration Management, Vulnerability Assessment program conducted. Litigation expenses of $8.2 million incurred. High level cleaning efforts conducted. Supported greater share of site overheads due to reduced 4A program production. Depleted uranium facilities operated only to produce derbies to support Y-12 and Rocky Flats material requirements. No depleted uranium produced for use in Savannah River reactors. No residue conversion.	Maintains SEU (N Reactor) support facilities in cold standby condition due to lack of funding to support permanent shutdown activities. Enhanced environmental and radiological monitoring, site maintenance activities, and T-Hopper refurbishment for UO_3 storage continue. Vulnerability and Risk Assessment program continue. Includes litigation expenses. Provides for greater DOE share of site overheads due to no 4A program production. Provides support for cleanup and radiological improvements to bring FMPC into compliance with DOE regulations. Enhances operator training program. Supports maintenance activities during upgrades of the refinery used for SEU residue conversion. Supports standby activities for depleted uranium facilities used in producing cores for Savannah River reactors.	Begins activities to place SEU (N Reactor) support facilities in permanent shutdown, including shutdown and cleanout of Plant 4 Hydrofluorination facility and consolidation of enriched uranium metal inventories for long-term storage. Environmental and radiological monitoring, site maintenance activities, and T-Hopper refurbishment for UO_3 storage continues. Supports safety-related systems of facilities that are expected to be operating over the long-term, such as Biodenitrification, General Purp and Boiler Plant. Supports Vulnerability and Risk Assessment programs. Supports continued litigation support activities. Continues full support for improved training programs. Supports maintenance of refinery used for residue conversion. Continues support of standby of depleted uranium facilities for Savannah River cores.
	Essential ES&H activities supported, including improved air sampling throughout the FMPC,	Continue to support essential ES&H activities, including support for environmental	Continue to support essential ES&H activities, including support for environmental

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Oak Ridge) (cont'd)	establishment of control barriers to enhance protection of personnel and environment from exposure to radioactive material. Site Safety Analysis program implemented. Continued to support activities required to comply with state and federal laws.	permitting, and increased support for radiological and environmental monitoring programs that will bring FMPC into compliance with DOE regulations. Site safety analysis program continues at minimal level. Continues to support activities required to comply with state and federal laws.	permitting and support for the air sampling program. Supports FMPC to achieve and maintain compliance with all applicable DOE regulations. Continues to support activities required to comply with state and federal laws.
	ICPP custom material recovered. Upgrades in support of uranyl nitrate handling made. No HEU shipped to SR for reactor operation; Y-12 facilities maintained in operational condition.	Recovers ICPP custom material. Supports upgrades for uranyl nitrate handling. No HEU shipments to SR for reactor operation; Y-12 facilities in operational condition. Enriched Uranium Conversion facility begins operation.	Recovers ICPP custom material. Supports processing of SR reactor returns, SRP uranium alloy scrap and shipments to SR. Ensures continued operation of the Enriched Uranium Conversion Facility.
Subtotal, Feed Materials	$ 69,452	$ 54,058	$ 67,970
Fuel and Target Fabrication (Richland)	Provided funding for minimal maintenance and surveillance of the fuel fabrication facilities. Minimum essential level of personnel maintained to provide required support and surveillance functions. Also included are costs related to the storage and handling of unirradiated fuel that will be discharged from the reactor. Environmental activities are limited to environmental monitoring.	Provide funding for minimal maintenance and surveillance of the fuel fabrication facilities. Minimum essential level of personnel maintained to provide required support and surveillance functions.	Funding for this activity has been transferred to Supporting Services, Shutdown and Standby.
	$ 3,000	$ 3,004	$ 0
(Savannah River)	300 area operations supported including fabrication of enriched uranium fuel tubes, lithium target tubes, control rods, and	Continues to support fabrication facilities in anticipation of resumption of reactor operations. Plans include preparation of a	Supports enhanced operation of facilities in support of reactor operations at SR. Actual production will depend on timing

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Savannah River) (cont'd)	housing for the production reactors. Limited production performed due to shutdown of the SR reactors. Fabrication facilities maintained and upgraded in preparation for resumption of reactor operations. Upgrades included procedure revisions and improved training to improve quality assurance and discipline of operations. Provided for safeguards and security, environmental, quality assurance, and information systems.	new charge for resumption of K reactor operation. Normal operations for replacement of charges as they are used in the reactors is expected to begin. Provides for safeguards and security, environmental activities, quality assurance and information systems.	of reactor restart and power levels. Provides for safeguards and security, environmental activities, quality assurance and information systems.
	$ 72,600	$ 76,140	$ 80,500
Subtotal, Fuel and Target Fabrication	$ 75,600	$ 79,144	$ 80,500
Irradiation (Richland)	N Reactor was defueled and fuel shipments made to PUREX for processing. Interim staffing levels were maintained pending final determination on the standby status for N Reactor as a tritium production option. Equipment was prepared for conversion to layup status to preserve outyear production capability. Initiated sludge removal at N Basin and repackaging and shipment of 1800 MTI canisters at the IDU Fuel Storage Basin. Dispositioned remaining aspects of the Safety Upgrade Program. Outplacement Center for displaced personnel supported. Environmental upgrade projects required to meet regulatory requirements concerning handling of hazardous	N Reactor is to be placed in dry layup condition by the end of FY 1990.	With completion of activities required to place N Reactor in cold standby in FY 1990, all costs associated with continued maintenance of N Reactor have been transferred to Supporting Services, Shutdown and Standby.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Richland) (cont'd)	wastes were continued. Required levels of safeguards and security maintained.		
	$ 98,544	$ 43,260	$ 0
(Savannah River)	Major activities were conducted in support of meeting DOE Technical Criteria and other reactor safety tasks in support of the earliest possible safe restart of the SRS reactors. In parallel with these short-term objectives, long-term programs to insure continued safe, reliable, operation until new production reactor capacity is available were pursued. Facility operations and maintenance personnel were used to support the reactor restart effort, providing for additional monitoring and evaluation, additional maintenance and upgrade support, plant configuration improvements, and fire protection improvements. Seismic programs conducted to upgrade K Reactor to meet criteria similar to those applied to older commercial nuclear powerplants by NRC.	Emphasis continues on meeting short-term reactor startup requirements and establishing a sound long-term program for staff, reliable operations. Seismic programs are directed toward the upgrade of the L Reactor.	A restart schedule is being finalized at this time. Supports final assembly of fuel, target, and control rod elements prior to irradiation, storage of highly radioactive discharged elements and disassembly/bundling of tubes and slugs in preparation for processing. Continues an enhanced maintenance program. Completes seismic upgrades to P Reactor similar to those completed in L and K reactors.
	Major progress made in the implementation of a long-term Reactor Safety Improvements Program (RSIP) including initiation of hiring approximately 500 additional technical and support staff over a 2-year period to support reactor improvements identified by this program. The RSIP	Efforts continue toward institutionalization of the RSIP. Efforts to bring additional technical and support staff on board will continue.	The RSIP continues supporting the long-term reliability of the SR reactors.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Savannah River) (cont'd)	encompassed a wide range of new and enhanced programs including operations and maintenance training and procedures, safety management systems, safety analyses, severe accident analysis, human factors and establishment and maintenance of the reactor design basis.		
	A detailed multifaceted program included extensive experimental and computational work necessary to demonstrate the adequacy of reactor response to a hypothetical severe loss-of-coolant accident (LOCA). Power Operating levels had been reduced to approximately 40% of historic full power until a more thorough understanding of behavior during a LOCA was achieved.	Maintains support of extensive experimental and analytical work necessary to demonstrate the adequacy of response to a hypothetical severe LOCA. The program will provide a validated technical basis for the power limits in support of K Reactor restart as well as the basis for subsequent increases in power level as the technical basis is refined and hardware and operational changes are made.	Continue to fully support a multifaceted program to resolve the power level issues.
	Emergency cooling systems (ECS) modifications are being made for improved heat removal capabilities under reactor LOCA. A fast scram capability is in development to more rapidly shutdown the reactor. A faster shutdown enhances subsequent heat removal efforts. The ECS and fast scram programs are central to reactor restart and restoring power to previous levels.	Continues the ECS hardware modification program and fast scram system with increase for reactor restart/escalation. The program supports the second phase, two component SRP Reactor System Model for the entire LOCA.	Maintains support for the ECS program with increases for escalation. Develops the next phase of the ECS computations which are based on maximum metal surface temperatures (MAXSRT) and applies them to the full spectrum of postulated accidents.
	A full scope Probabilistic Risk Assessment (PRA) of the operation of the production reactors began October 1987. The analysis was comparable to those performed for some commercial reactors and	Continues work toward the completion of the PRA program and its use to aid in identification and prioritization of projects to improve reactor safety and in support of reactor operation.	Supports updating the PRA program and its continued use in the prioritization and identification of Reactor Safety projects and in support of reactor operation.

III. Activity Description: (Dow BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Savannah River) (cont'd)	attempted to qualify the complete spectrum of risk for reactor operations. The assessment entailed a much greater breadth and depth than any previous study of reactor safety.		
	The Reactor Operations Program included the operation and support costs associated with environmental compliance activities. The major emphasis was directed toward compliance with Resource Recovery and Conservation Act (RCRA), Clean Water, Clean Air, Safe Drinking Water Act and the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). Additional activity included comparability with Nuclear Regulatory Commission guidelines on minimizing radiation exposure as formulated by the As Low As Reasonably Achievable (ALARA) Program.	Continues support costs associated with compliance activities for RCRA and CERCLA. Maintains support for ALARA and studies of radionuclide and chemical transport and distribution.	Maintains support costs associated with compliance with RCRA and CERCLA. Maintains support for ALARA and radionuclide and chemical transport studies.
	The Reactor Operations Program supported the activities necessary to comply with DOE guidance to operate nuclear facilities in a secure manner. The activity included the prorata support costs associated with administration and operation of an approximate 800 man guard force necessary for access control.	Continues support of the Safeguards and Security (S&S) Program.	Continues support of the S&S Program.

III. Activity Description: (Dev BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Savannah River) (cont'd)	A Technical Baseline Program was initiated to verify the capability of selected reactor systems to provide safety functions in response to significant Design Basis Events. Supported baseline of those systems identified as necessary for the restart of K Reactor.	The Technical Baseline Program continues at the FY 1989 level of effort.	The Technical Baseline Program continues at the FY 1990 accelerated level.
	$358,636	$499,111	$652,568
Idaho	Supported Savannah River Reactor Restart Activities.	Continue to support Savannah River Reactor Restart Activities. However, amount of support will be determined later.	Continue to support Savannah River Reactor Restart Activities, as required. Amount of support will be determined later.
	$ 10,473	$ 0	$ 0
(Headquarters)	Supported funding for Institute of Nuclear Power Operations (INPO), Defense Nuclear Safety Board and Idaho support to Savannah River Site reactor restart activities.	Supports funding required for various activities which occur during the fiscal year including National Academy of Sciences reviews, investigative and review groups for tiger teams, etc.	Supports funding required for various activities which occur during the fiscal year including National Academy of Sciences reviews, newly established requirements, etc.
	$ 2,655	$ 6,516	$ 6,000
Subtotal, Irradiation	$470,306	$548,887	$658,568
Total, Reactor Operations	$620,028	$686,009	$811,457

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY
NUCLEAR MATERIALS PRODUCTION

I. Preface: Processing of Nuclear Materials

The processing portion of the Nuclear Materials Production budget includes operations at the Idaho National Engineering Laboratory, the Y-12 Plant, the Oak Ridge National Laboratory (ORNL), the Hanford site, the Savannah River Site, and the Los Alamos National Laboratory. Processing funds are also used to support the Special Isotope Separation program.

The current status of many of the processing facilities is similar to that of the reactors, before the intensive safety enhancement efforts began. Funding constraints have forced deferral of preventive maintenance, operational improvements, operator training, enhanced technical support, improved incident analysis systems and the like. The Department of Energy must begin to correct these known deficiencies or face eventual facility shutdowns. The Department cannot and will not operate any facility without assurance it can be operated safely and reliably.

On December 21, 1989, the National Research Council of the National Academy of Sciences issued a report entitled, "The Nuclear Weapons Complex, Management for Health, Safety and the Environment." The NRC study focused on the 17 major non-reactor installations in the nuclear weapons complex. Their results included recommendations for improvements in areas of management, industrial safety, fire safety, criticality safety, seismic safety and occupational health. Many of their findings echo the types of improvements currently included in our reactor restart program. The Department is beginning to develop an implementation plan to address these issues. However, the results of the NRC study were not unexpected. In fact, based on the experience gained at our reactor facilities, DOE had already taken steps to identify problems at non-reactor facilities. At Savannah River this resulted in the development of a Non-Reactor Improvements Plan. Although funded at a slower pace than the Reactor Operations Management Plan, the Non-Reactor Improvements Plan and similar efforts at other sites, have been incorporated into our FY 1991 budget request.

The PUREX plant at Hanford will continue to operate to process the backlog of irradiated N Reactor fuel to recover weapon-grade plutonium and current plans are to transfer operations of the PUREX facility to the Office of Environmental Restoration and Waste Management as of the fourth quarter of FY 1991. Funding has been realigned to accommodate this transfer based on weapon-grade plutonium production being completed by July 1991.

In addition, the Plutonium Reclamation Facility will be operated at Hanford to process plutonium residues. The Remote Mechanical C Line will also continue to be operated to produce metal from the plutonium resulting from PUREX and PRF operations for shipment to Rocky Flats.

The New Special Recovery Facility and HB-Line Neptunium Oxide Facility at the Savannah River Site are planned for operation for the first full year in FY 1990. F and H area plants will recover tritium, plutonium and uranium from Savannah River reactor operations and complex wide scrap material as funding permits.

The uranium facilities at the Idaho Chemical Processing Plant will be operated to receive and process spent-fuel from the Naval propulsion program. At LANL, plutonium scrap recovery programs will continue to support weapons program needs. This budget also supports the newly established program at ORNL to process and recover isotopes needed to support weapons research and development.

This budget implements an orderly closeout of the Special Isotope Separation (SIS) program. The Department of Energy has reviewed projections of future requirements for weapons-grade plutonium and determined that the production capability that would have been provided by the SIS program is not currently justified in light of fiscal limitations.

II. A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request	% Change
Fuels	$ 399,621	$ 467,860	$ 562,469	20%
Special Isotope Separation	78,019	75,410	66,500	-12%
Total, Processing of Nuclear Materials	$ 477,640	$ 543,270	$ 628,969	16%

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory	$ 290	$ 0	$ 0	0%
Idaho National Engineering Laboratory	82,820	96,415	109,020	13%
Laurence Livermore National Laboratory	67,019	60,453	44,000	-27%
Los Alamos National Laboratory	12,031	11,114	10,885	-2%
Oak Ridge National Laboratory	2,700	1,375	4,492	227%
Rockwell International Corporation	598	0	0	0%
Westinghouse Savannah River Company	194,805	218,761	315,288	44%
Westinghouse Hanford Company	113,585	139,708	135,961	-3%
Pacific Northwest Laboratory	437	0	0	0%
Martin Marietta Y-12	850	1,465	1,611	10%
Oak Ridge Miscellaneous	1,765	1,705	1,712	0%
Germantown (HQ)	740	12,274	6,000	-51%

III. Activity Description: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Processing of Nuclear Materials			
Fuels (Idaho)	Processed Naval Reactor and other fuels, including custom process materials. Conducted efforts to improve throughput consistent with planned future requirements. Supported minimum level five shift operations to provide adequate training to operators. Provided maintenance, engineering, technical, safety and quality assurance support for processing operations. Began use of new Computer Support Facility to upgrade data available to support processing operations.	Continue to process custom process materials. Continue throughput improvement efforts. Support optimum level five shift operation, which increases fifth shift staffing to 17 from 16 to avoid interruptions when employee absences occur. Provide maintenance, engineering, technical, safety and quality assurance support for processing operations.	Begin headend Fluorinel and Rare Gas Plant campaign processing. Operations will begin after Remote Analytical Laboratory maintenance outage. Maintain fifth operating crew at optimum staffing Level. Provide maintenance, engineering, technical, safety and quality assurance support for processing operations.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Idaho) (cont'd)	Received, stored, packaged and handled assigned fuels. Maintained the capability for wet and dry storage. Conducted fuel canning tests and completed deteriorated Triga fuel repackaging. Transferred fuels from CPP-603 in effort to eliminate fuel storage in that area. Provided necessary maintenance, engineering, technical, safety and quality assurance support for storage operations.	Operate and maintain fuel receipt and storage facilities. Continue transfer of miscellaneous fuels from the CPP-603 pools. Provide necessary maintenance, engineering, technical, safety and quality assurance support for storage operations.	Operate and maintain fuel receipt and storage facilities. Continue transfer of miscellaneous fuels from the CPP-603 pools. Provide necessary maintenance, engineering, technical, safety and quality assurance support for storage operations.
	Operated the Coal Fired Steam Generation Facility at 90% availability. Developed load capacity test procedures.	Operate the Coal Fired Steam Generation Facility.	Operate the Coal Fired Steam Generation Facility.
	Supported safety and environmental activities required for assuring minimum risk to personnel, facilities and the environment. Emphasis placed on compliance with safety regulations and minimization of effluent discharge. Issued solid waste descriptive manual and conducted twelve emergency response exercises. Implemented two new DOE environmental orders. Developed programs for improved fire protection, medical program upgrades, waste generation reduction, and industrial and radiation safety.	Formation of Environmental Compliance Office to identify environmental deficiencies at INEL and actions necessary to correct these deficiencies. Support safety and environmental activities required for assuring minimum risk to personnel, facilities and the environment. Strengthen the solid waste management program to reduce volumes of radioactive and nonradioactive wastes. Implement radiation protection program requirements; upgrade plant operating procedures for consistency with current operational safety requirements and technical standards; enhance operator training programs; respond to Technical Safety Appraisals deficiencies; accelerate asbestos removal program; reduce maintenance backlogs; and revise SAR's.	Continued effort on identifying and correcting all environmental deficiencies. Support safety and environmental activities required for assuring minimum risk to personnel, facilities and the environment. Continue to plan for future requirements and implement measures to ensure continued Idaho Chemical Processing Plant compliance with laws and regulations.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Idaho) (cont'd)	Provided required levels of safeguards and security. Completed study of security systems and implemented corrective measures.	Provide required levels of safeguards and security.	Provide required levels of safeguards and security.
	Conducted process improvement efforts for the soluble poison and geometrically favorable dissolver option. Explored potential improvements to existing dissolution solvent extraction systems. Placed Fluorinel pilot plant in operation.	Continue process improvements activities. Continue study efforts on geometrically favorable dissolver option. Continue efforts to improve existing systems and develop and verify optimum flowsheets.	Conduct process improvement efforts including work with pilot plants and mockups to develop and verify processes and flowsheets. Continue work on geometrically favorable dissolver option.
	$ 72,047	$ 82,640	$ 86,320
(Oak Ridge)	Recover uranium scrap for recycle into the production stream. Provide for a commercial firm to process scrap uranium generated by miscellaneous DOE R&D organizations as required under Central Scrap Management Office (CSMO) activities.	Perform minimal uranium scrap recovery operations, with balance of material being stored for future processing. Provide for a commercial firm to process scrap generated by miscellaneous DOE R&D organizations as required under CSMO activities.	Perform scrap recovery operations to return increased quantities of enriched uranium to the production stream. Eliminate the need to continue to send additional material to storage for future processing. Provide for a commercial firm to process scrap generated by miscellaneous DOE R&D organizations as required under CSMO activities.
	Prepare for and test new capability to process and recover heavy actinide isotopes for use in the weapons program. Arrangements were completed for shipping cask leasing, assembly loading and unloading. Cask was transported and handled for cold testing of equipment and facilities. (Partial funding for this effort was provided by Weapons Program.)	Ship and process one assembly to recover heavy actinide isotopes for use in the weapons program. (Partial funding for this effort is to be provided by Weapons Program.)	Ship and process one assembly to recover heavy actinide isotopes for use in the weapons program.

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III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Oak Ridge) (cont'd)	Fabricated Cf-252 neutron sources and prepared shipments of bulk Cf-252 to meet requirements of commercial and government users. Revised BAR for packaging.	Provide for limited fabrication of Cf-252 neutron sources and preparation of shipments for commercial and government users. Funding cannot support known requirements and user requests will be backlogged. ES&H improvements to Cf-252 facilities will be continued.	Assure a stable program of Cf-252 neutron source fabrication and shipments at a level that is fully responsive to anticipated commercial and government user requirements. Eliminates backlog of user requests. Includes funding for processing of heavy actinides for the weapons program.
	$ 5,315	$ 4,545	$ 7,815
(Richland)	Processed WG fuel through PUREX. Processed fuel grade oxide and shipped to SRS. Processed uranium through the Uranium Trioxide (UO_3) and shipped to FMPC. Recovered Pu from scrap in PRF. Combined recovered Pu from scrap with Pu nitrate from PUREX and converted to metal in the RMC line. Supported essential operations, maintenance, environmental, safeguard and security activities. Provided support to ongoing construction projects. Initiated upgrades for Training Accreditation Program and remedial actions at PFP to remove Pu from ductwork. Supported limited operational assurance activities to reduce deficiencies and provide independent oversight. Funding at Richland for processing includes the PUREX plant, the UO_3 plant, and the Plutonium Finishing Plant. Since RHP does not budget by facility to attempt to determine the exact cost per facility would require the addition of several	Provide for processing of N Reactor fuel. Processing quantities contingent on resolving environmental issues with the State of Washington. Process available feed through UO_3 plant. Recover plutonium scrap in PRF. Combine recovered scrap with Pu nitrate from PUREX and convert to metal in RMC line. Support essential operations, maintenance, environmental, safety, quality and safeguards and security activities. Provide support to ongoing construction projects. Continue upgrades for Training Accreditation Program. Support improved base technical training program. Support operational assurance activities to reduce deficiencies and provide independent oversight. Continue removal of Pu in ductwork. Initiate repair of chem prep floor at PFP. Support additional operations shift training to provide personnel flexibility. Increase support to incorporate engineering change notices to	Process N Reactor fuel through PUREX to support site cleanup operations. Process recovered uranium through UO_3 plant. Recover Pu from scrap in PRF. Process recovered Pu from scrap and convert to metal in the RMC line. Provide fabrication support to maintain PUREX critical jumper inventory. Operate PUREX Plant to convert crude neptunium to a solid form to meet Federal Trade Commission shipping regulations. Support essential operations, maintenance, environmental, safety, quality assurance, and safeguard and security activities. Continue upgrades required to implement the Training Accreditation Program. Provide support to ongoing construction projects. Support operational assurance activities to reduce deficiencies and provide independent oversight. Continue removal of Pu in ductwork and repair of chem prep floor at PFP. Continue incorporating engineering change

III. Activity Description: (Row BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Richland) (cont'd)	components in the operating expenses, capital equipment, and construction categories.	facility drawings and asbestos abatement efforts. Increase activity needed for equipment/ facilities and services cleanout to reduce contamination and minimize exposure to plant personnel.	notices to facility drawings and removing asbestos. Increase decontamination and repair of PUREX equipment at T Plant and incremental PUREX jumper fabrication to minimize downtime. Increase activity needed for equipment/ facilities and services cleanout to reduce contamination and minimize exposure to plant personnel. Assumes operation of PUREX by the Office of Environmental Restoration and Waste Management in the fourth quarter FY 1991.
	$113,945	$139,708	$135,961
(Savannah River)	Operated two Separations Areas (F and H) for the purification and reprocessing of Pu-239, uranium and tritium. Processing plutonium-238 through HB-Line was discontinued when the available feed was depleted.	Continue operation of two Separations Areas. Process fuel and targets in F Canyon and through H Canyon. Pu-238 processing in HB Line will resume. Pu-239 processing in HB Line will be initiated. Enriched uranium/plutonium-239 processing in HB-Line will be initiated.	Continue operation of F and H canyons. Enriched uranium/Pu-239 processing in HB-Line will continue as funds can be made available.
	Operated the Central Scrap Management Office (CSMO) for the control of plutonium-239 scrap. Technical plant assistance provided by the Savannah River Laboratory for safety analyses relating to operations of the separations facilities.	Operate the Central Scrap Management Office (CSMO) for the control of plutonium-239 scrap. Technical plant assistance will be provided by the Savannah River Laboratory for safety analyses relating to operations of the separations facilities.	Operate the CSMO for the control of Pu-239 scrap. Technical plant assistance continues to be provided by the Savannah River Laboratory for safety analyses relating to operations of the separations facilities.

(11. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Savannah River) (cont'd)	Prepared the New Special Recovery for operation.	New Special Recovery will begin operations to process Pu-239 scrap from the production complex as funding is made available.	New Special Recovery Operations continue processing Pu-239 scrap from the production complex.
	The receipt, storage, and preparation for processing of offsite spent domestic and foreign nonproduction fuels in the Receiving Basin for Offsite Fuels (RBOF) continued.	The receipt, storage, and preparation for processing of offsite spent domestic and foreign nonproduction fuels in the Receiving Basin for Offsite Fuels (RBOF) continues.	The receipt, storage, and preparation for processing of offsite spent domestic and foreign nonproduction fuels in the RBOF basin continues.
	The Nuclear Materials Program included support costs associated with environmental compliance activities. The major emphasis was directed toward compliance with Resource Recovery and Conservation Act (RCRA) and the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). Additional activity included efforts to assure comparability with Nuclear Regulatory Commission guidelines on minimizing radiation exposure as formulated by the As Low As Reasonably Achievable (ALARA) program.	Continue support costs associated with compliance activities for RCRA and CERCLA. Maintain support for ALARA and studies of radionuclide transport. Increases are due to escalation and increases in overall site environmental activities.	Maintains support costs associated with compliance with RCRA and CERCLA, increases for escalation and a slight increase in sitewide activity.
	The Nuclear Materials Program supported the activities necessary to comply with DOE guidance to operate nuclear facilities in a secure manner. The activity included the prorata support costs associated with administration and operation of an approximate 800 man guard force necessary for access control.	Continue support of the Safeguards and Security (S&S) program with increases for escalation and accountability work associated with scrap processing. Begin efforts for operation surety program.	Continue support of the S&S program with increases for escalation and accountability work. Continue operations surety programs initiated in FY 1990.
	$194,805	$218,761	$315,288

III. Activity Description: (Dow BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Fuels, All Other (Albuquerque)	Provided technology development in support of plutonium processing enhancements. Development efforts that support HMP activities concentrated on ash treatment, pyrochemistry, pit recovery and precipitation. Supported scrap processing capability in Building TA-55, however no scrap processing accomplished this year. Provided required level of safeguards and security.	Continue to provide technology development in support of plutonium processing enhancements. Continue to support scrap processing capability in Building TA-55. Provide required level of safeguards and security.	Continue to provide technology development in support of plutonium processing enhancements. Continue to support scrap processing capability in Building TA-55. Provide required level of safeguards and security.
(Chicago)	$ 12,031 Supported combined studies for isotopes correlation technology and development as applicable to material control and accountability techniques.	$ 11,114 No activity.	$ 10,885 No activity.
(San Francisco)	$ 290 Complete certain decontamination activities at Rockwell International. Transfer all other D&D activities to Defense Waste and Environmental Restoration program.	$ 0 No activity.	$ 0 No activity.
(Headquarters)	$ 590 Continues HQ support contracts.	$ 0 Continue HQ support contracts and technical oversight such as the National Academy of Science.	$ 0 Continue to support HQ contractual requirements.
Subtotal, Fuels	$ 590 $399,621	$ 11,092 $467,860	$ 6,000 $576,469
Special Isotope Separation	Plant deployment activities: Completed the Environmental Impact Statement and NEPA Record of Decision. Prepared a Site Safety Issues Review and obtained various State of Idaho	Begin orderly phaseout of the SIS program. Complete closeout of plant construction activities at Westinghouse Idaho Nuclear Company, LLNL, and associated contractors.	Continue the orderly phaseout of the SIS program, including the completion and documentation of related development activities.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Special Isotope Separation (cont'd)	environmental permits. Prepared and submitted the draft Preliminary Safety Analysis Report (PSAR). Supporting development activities: Issued Engineering Demonstration System (EDS) environmental and safety documents, and maintenance and operating procedures. Installed and activated systems required for the Plant Performance Verification (PPVS) tests. Performed a sustained operation test prior to Pu loading. Demonstrated mainline pyrochemical and Pu chemical processes in the Metal Production Line (MPL).		
Subtotal, Special Isotope Separation	$ 78,019	$ 75,410	$ 66,500
Total Processing of Nuclear Materials	$477,466	$543,270	$442,909

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR MATERIALS PRODUCTION

I. Preface: Supporting Services

The funds in the supporting services account are in direct support of the activities being performed in the processing and reactor operations portions of this program. Supporting services provides for essential activities to maintain production and continue facility operations at all of the Nuclear Materials Production Sites to retain nuclear materials production capability for national defense. Applied development on current operating processes is needed to assure continued, efficient, and safe operation and to meet production goals. This effort includes: development of engineering improvements for environmental protection and safety concerns, process optimization to maximize production at minimum unit cost, development of alternative production methods to respond to changes in the production and product requirements, etc. In view of the current status of the reactor restart activities at the Savannah River Site, it is essential to maintain an adequate level of environmental, safety, and health to ensure successful restart and operation. The new and more stringent standards for maintenance, training, and technical feasibility make the funding requirements imperative.

Program funds provide startup, shutdown, and standby costs for production facilities needed to meet either current material requirements or possible future requirements. Other supporting services activities include production of lithium compounds and uranium metals for weapons; transportation and security for material shipments; conceptual engineering studies; safety, environmental and safeguards costs; long-range nuclear materials management planning; improved project management general site safety improvement activities; warehousing; funding of inventories such as common use stores, and production of other nuclear materials inventories; and miscellaneous contractor activities where there are large amounts of funding to support overall landlord facility operation expenses.

II. A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request	% Change
Startup, Shutdown and Standby	$ 18,397	$ 13,332	$ 48,400 a/	263%
Other Procurement and Production	7,846	0	12,211	100%
Restoration/Retention	2,000	985	0	-100%
Process Development	50,958	51,712	54,000	4%
Miscellaneous Activities	142,434	137,828	147,484	7%
Conceptual Engineering	30,059	27,878	28,830	3%
Inventories	6,265	993	11,118 b/	1,020%
Total, Supporting Services	$ 257,959	$ 232,728	$ 302,043	30%

a/ Large increase is due to a shift in N Reactor funding from Reactor Operations to Supporting Services in FY 1991.
b/ Inventories is actually changes in inventories. Large increase needed to keep facilities operational.

II.B. Major Laboratory and Facility Funding:

Program Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request	% Change
Argonne National Laboratory	$ 89	$ 0	$ 0	0%
Feed Materials Production Center (FMPC)	5,393	9,241	14,211	54%
Idaho National Engineering Laboratory	5,112	8,028	9,170	14%
Los Alamos National Laboratory	11,908	4,766	5,118	10%
Martin Marietta (DRBBP)	30	(823)	0	-100%
Martin Marietta (Y-12)	5,077	5,886	800	-86%
Oak Ridge National Laboratory	1,223	1,300	1,364	5%
Pacific Northwest Laboratory	355	0	0	0%
San Francisco Operations Office	1,442	0	0	0%
Westinghouse Savannah River Company	203,360	173,033	204,459	18%
Westinghouse Hanford Company	19,039	25,846	61,490	138%
Oak Ridge Miscellaneous	2,056	370	380	3%
Germantown-(HQ)	2,655	7,081	5,051	-29%

III. Activity Description: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Supporting Services			
Startup, Shutdown, and Standby (Idaho)	Continued startup activities for GPP and capital equipment projects. Continued work on Idaho Fuel Processing Facility Restoration (IFPFR) project. Prepared systems operations (SO) test procedures and operating manuals. Completed startup efforts on Fuel Processing Facility Upgrade (FPFU) task E cell/cells Remote Sampling and Transfer System.	Continues startup efforts on completed capital equipment, GPP, and line item construction projects. Completes startup of FPFU for Waste System Upgrade, Second and Third Cycle Raffinate and first phase of Glove Box Sampler and Transfer System. Pursue efforts on FPR startup at an intensified level for SO test preparation, SO test performance, and operating manuals.	Continue annual startup efforts on completed capital equipment, GPP, and line item construction projects. Continue efforts on FPR startup at an intensified level for SO test preparation, SO test performance, and FPR operating manuals. Complete startup of FPFU tasks for High Level Liquid Waste System Evaporator, Liquid Effluent Treatment and Disposal (LET&D), Acid Recycle and the second phase of the Glove Box Sample and Transfer System.
	$ 2,289	$ 2,128	$ 3,350
(Oak Ridge-FMPC)	Pilot Plant placed in Standby status. Startup of four dust collectors, the Storm Water Retention Basin, and the Purge lagoon. Initial efforts to plan the startup of the Main Tank Farm	Costs include a normal effort to maintain equipment in process areas in a standby status; engineering efforts to complete documentation for shutdown of the Pilot Plant; startups of the ES&H	Continue to maintain equipment in a standby status; supports startup of ES&H subprojects, a Muxal furnace, several dust collectors, HVAC systems and improvements to the Nitric Acid

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Oak Ridge-FMPC) (cont'd)	and metal dissolver were initiated.	building expansion; EMSI subprojects including radiation alarm upgrades and reduction furnace cooler ventilation; and four dust collectors; other startups include slag mill, plant 6 sump, F-machines, rotary kiln, general sump upgrade, and water plant improvements. Startup effort for the Main Tank Farm and the metal dissolver will be completed.	Recovery system (KAR). Startup efforts for GPP and CE projects are also included.
	$ 2,228	$ 6,536	$ 2,000
(Oak Ridge-ORGDP)	Supports ORGDP standby status.	No activity. This activity was transferred from Nuclear Materials Production to Defense Waste and Environmental Restoration this fiscal year.	No activity.
	$ 30	$ -825	$ 0
(Oak Ridge-Y-12)	Conducted prestartup facility testing, operator training and other preparations activities for the enriched uranium conversion facility.	Complete prestartup activities and initiate operation of the enriched uranium conversion facility.	No activity.
	$ 3,850	$ 3,915	$ 0
(Total Oak Ridge)	$ 6,108	$ 9,626	$ 2,000
(Richland)	No activity.	No activity.	Provide continued support for minimal maintenance and surveillance for the N Reactor, Fuel Fabrication and various supporting facilities. Essential personnel are maintained to provide required support, surveillance, and minimum core functions for a 3-year restart. Provide for continued shipment of fuel elements to PUREX from the K basins for processing. Sludge

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Richland) (cont'd)			removal from the KE segregation pit will be completed. Sludge removal from the 105KE fuel storage basin will be initiated following completion of irradiated fuel shipments. Ensure compliance with all state and federal environmental regulations. Initiate program to decontaminate areas within the N Reactor confinement (Zone 1) to acceptable levels, reducing possibility of radiological releases, the potential for loss of contamination control improving productivity by eliminating the requirement for respiratory protection. Provides for increased maintenance support to layup activities and physical repairs of operating systems at both 100-N and 100-K.
	$ 0 g/	$ 0 g/	$ 41,250
(Savannah River)	Provides for final preparation for and startup of the New Special Recovery Facility and HB-Line startup while safety reviews are conducted. C&R reactors and Building 777-10A were maintained in safe standby condition. Feed Preparation Development Facility decontamination and reclamation work was performed.	Provides for final preparation and startup of the New Special Recovery Facility. Continues maintenance of C and R reactors and Building 777-10A in safe standby status.	Continues maintenance of C and R reactors and Building 777-10A in safe standby status.
	$ 10,000	$ 1,576	$ 1,800
Subtotal, Startup, Shutdown, and Standby	$ 18,397	$ 13,332	$ 48,400

g/ Costs for maintaining N Reactor in standby in FY 1989 and FY 1990 appear under Reactor Operations--Irradiation.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Other Procurement and Production (Oak Ridge)	FMPC delivered DU derbies to Y-12 and to Rocky Flats.	In FY 1990, FMPC suspended operations for a major portion of the year. Funds ($.5 million) have been provided to Y-12 for initiating contracting with commercial vendors for production of DU derbies for Y-12 and Rocky Flats.	Funding is provided for DU purchases for the weapons program and for related activities necessary to support DU production.
	$ 7,846	$ 0	$ 12,211
Subtotal, Other Procurement and Production	$ 7,846	$ 0	$ 12,211
Facilities Restoration (Savannah River)	Supported ongoing Productivity Retention Program (PRP). Work included conceptual design, scope of work definition, cost estimating and other activities required to obtain project authorization and implementation.	Continue support for PRP.	No activity.
	$ 2,000	$ 985	$ 0
Subtotal, Facilities Restoration	$ 2,000	$ 985	$ 0
Process Development (Albuquerque)	Completed Molecular Laser Isotope Separation closeout activities.	No activity.	No activity.
	$ 6,500	$ 0	$ 0
(Oak Ridge)	Supported process development activities at the Fernald Feed Materials Production Center.	No activity.	No activity.
	$ 1,741	$ 0	$ 0
(Richland)	Established objectives and monitored implementation for environmental compliance activities; i.e., effluent monitoring plans, compliance	No activity.	No activity.

III. Activity Description: (Use BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Richland) (cont'd)	inspections and assessments, and Part B Permits.		
	$ 355	$ 0	$ 0
(San Francisco)	Complete closeout of Plasma Separation Process.	No activity.	No activity.
	$ 1,662	$ 0	$ 0
(Savannah River)	Process development activities were directed toward scrap recovery process development, development of techniques for plutonium recovery from high fired residues, development and evaluation of selected site return processes (enhanced HSR operations), process support to the Uranium Solidification Facility (USF), optimization experiments for SRP solvent extraction operations, and engineering demonstration of remote automation techniques for Separations processes. Independent evaluation of nuclear and process safety was also provided through safety analysis reports and in-depth special process safety evaluations. Extensive computer databanks, verifiable metrological and dose codes, and fault-free and human factors techniques were maintained to provide reliable safety analysis reports for all non-reactor designated facilities. Support was provided to the Tritium Extraction Program to ensure a safe and efficient	Process development activities will continue with emphasis in four major areas; production support, environmental support, environmental technology and tritium support. Increased efforts will be placed on potential pyrochemical applications to scrap and plutonium feed stocks, installation of a laboratory for pyrochemical process development, pyro/aqueous process development with waste minimization objectives unique to SR, and demonstration of remote automation techniques. Flowsheet development/ demonstration for site return and plutonium residue processing in HSR will continue.	Process development activities will be carried out at optimum levels. The flowsheet development and verification program critical to successful SRS processing of new alloys, scraps, and site returns will be enhanced. SRL's support of the enahnced new special recovery facility and the variety of materials to be processed will require additional funding.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Savannah River) (cont'd)	process to ensure SRS' ability to meet current and future weapons systems requirements. Development of a new hydride technology was underway. Associated with this technology, in-bed accountability tests with protium and tritium was conducted and the tritium effects on hydride beds are being characterized. advanced hydride lab tests of the aluminum block thermal cycling absorption process (TCAP) is underway.		
	SRL's environmental organizations performed a variety of regulatorily required environmental studies on the site to assure compliance with local, state, and federal environmental regulations. Some of the more significant programs in progress are groundwater protection and cleanup, environmental impact statements (EIS), waste site closures, and safety analysis field investigations and analyses to define site geohydrologic conditions, and support to demonstrate a balanced biological community in the lower half of L Lake. Remote sensing applications for environmental and Waste Management activities was developed. An enhanced cooperative program began in FY 1989 to enhance cooperation between local colleges and universities and SRS. A more active technology transfer program also began in FY 1989 and eventually the technology program is projected to be a positive cash generator for the Federal Treasury through royalties	SRL will continue to support sitewide environmental activities. The radionuclide assessment program is a 3-year program to produce a comprehensive profile of radionuclide in the SRS environment. The program began with a limited budget in FY 1989 and additional funding will be used for resources to ensure completion of the program on a timely basis. The Biodiversity Program, a new initiative, will provide improved documentation, reorganization of existing data bases of historical monitoring data, the purchase of remote sensitive data and additional processing data. The program includes additional groundwater modeling of the extraction system and new recovery monitoring wells (including investigation of the groundwater beneath the SRS coal piles) and testing of the horizontal well in-situ remediation system.	SRL will continue to support sitewide environmental activities. The radionuclide assessment program in the third year will continue to compile and interpret radionuclide monitoring data, evaluate current and future impacts to biota, and identify additional data. Initiation of the aquatic system portion of the Biodiversity Program. Demonstration of bioremediation (in-Situ) such as bioreactors as developed from bench and pilot tests completed in FY 1990 and SRS coal piles studies interpretation in FY 1991 will be performed.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Savannah River) (cont'd)	collected from SRS technology patents.	Development of an SRL Effluent Treatment System to handle the Laboratory's radioactive and hazardous waste will be initiated along with a program to improve decontamination technology.	
(Total Savannah River)	$ 40,700	$ 51,712	$ 54,000
Subtotal, Process Development	$ 50,958	$ 51,712	$ 54,000
Miscellaneous Activities (Albuquerque)	Completed assignments agreed on with CRMP, including reviews of the SRS reactor power limits, the Probabilistic Risk Assessment (PRA) extension and sensitivity reactor Safety Analysis Reviews (SAR), and other selected issues. Nuclear processing facility independent safety reviews: completed two reviews; initiated and completed one review; initiated two reviews. Software has been developed at CRMP to study and analyze all aspects of SNM production. This software is the main tool used by CRMP in all of their planning activities. Software has been generated with the assistance the Savannah River Planning Support Group to address materials processing and production requirements and complex-wide capabilities. The software was validated against present complex-wide capabilities and could be utilized as an analysis tool for long-range planning.	Complete assignments agreed on with CRMP, including reviews of the SRS power limits and other selected issues. Nuclear processing facility independent safety reviews: complete two reviews; initiate and complete two reviews, initiate one review. Software development activities will continue as required to meet the needs of the CRMP and Savannah River planning groups. Software development activities will include the addition of graphics and post-processing modifications as needed to support and supplement analyses studies performed at CRMP and Savannah River. Analyses activities may also be required.	Complete assignments agreed on with CRMP, including reviews of the SRS power limits and other selected issues. Nuclear processing facility independent safety reviews: complete two reviews; initiate and complete two reviews, initiate one review. Will perform review or request by Office of Nuclear Materials Production. Continue to provide software support at required levels.
	$ 5,408	$ 4,766	$ 5,118

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Chicago)	Continued activities in support of planning, technical, and information systems.	No activity.	No activity.
	$ 89	$ 0	$ 0
(Idaho)	Measurements of neutron multiplication in beryllium were made of the neutron yields of the source itself, and the source surrounded by beryllium blankets of four separate thicknesses. The systematic effects were examined carefully by both calculational and experimental methods.	The principal activity during FY 1990 is the analysis of data. The entire body of experimental data is being carefully examined to determine how well the questions regarding neutron multiplication in beryllium have been answered. Additional experimental or calculational studies will be performed as necessary to establish the multiplication to the maximum attainable accuracy. A final report will be prepared and issued. Provides for essential ES&H and S&S activities.	No activity.
	$ 893	$ 482	$ 0
(Oak Ridge)	Costs were incurred to ship derbies to the Y-12 Plant at Oak Ridge, Tennessee.		
	Provided funds for the repackaging of Thorium stored in bins and silos at Feed Materials Production Center (FMPC). Support for the warehousing, inventory, and sampling of uranium materials was also provided.	Provides for the continuation of the Thorium disposition program.	
	Provided travel and direct subcontract support associated with the Nuclear Materials Production program at Oak Ridge Operations.	Continues support for all travel and direct subcontract support associated with the Nuclear Materials Production program at Oak Ridge Operations.	Continue to provide for all travel and direct subcontract support associated with the Nuclear Materials Production program at Oak Ridge Operations.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991@
(Oak Ridge) (cont'd)	Prepared a comprehensive probability risk assessment of existing facilities and preliminary studies for the vent upgrades.	Perform preliminary safety analysis report and finalize the probability risk assessment at Y-12.	No activity planned at Y-12.
	Supported operation at the Y-12 U-233 Storage and Distribution Center, and maintenance of U-233 processing and support systems in long-term, safe standby condition at Oak Ridge National Laboratory (ORNL). A self-assessment was conducted. An action plan for upgrading equipment, facilities, and management activities to satisfy current DOE requirements for environmental, health, and safety compliance was completed. Planning the removal of stabilized, abandoned systems was initiated in order to reduce facility maintenance requirements.	Continue operations of the U-233 Storage and Distribution Center. U-233 processing and support systems will be maintained in long-term, safe standby condition at ORNL. Implement an action plan for upgrading equipment, facilities, and management activities.	Continues operation of the U-233 Storage and Distribution Center. U-233 processing and support systems will be maintained in long-term, safe standby condition at ORNL. Equipment, facilities, and management activities will be reviewed and upgraded to satisfy current DOE requirements for environment, health, and safety compliance to the extent permitted by the funding level.
	Includes an adjustment of for transfer of various activities to the new Environment Management program.		
	$ -5,565	$ 3,776	$ 1,744
(Richland)	Prepared and provided yearly revision of the Chemical Processing Long-Range Plan. Provided engineering studies to support strategic and long range missions.	Prepare and provide yearly revision of the Chemical Processing Long-Range Plan. Provide studies to support strategic and long-range missions as requested.	Prepare and provide yearly revision of the Chemical Processing Long-Range Plan. Provide studies to support strategic and long-range missions as requested.
	Provided safeguard and security services including planning, reporting, vulnerability assessments, engineering, and maintenance of general equipment. Provided support to Materials	Operations and nonprotected area Safeguards & Security services including planning, reporting, vulnerability assessments, engineering, and equipment maintenance. Perform plant	Operations and nonprotected area Safeguards & Security services including planning, reporting, vulnerability assessments, engineering, and equipment maintenance. Perform plant

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Richland) (cont'd)	Management Executive Committee (MMEC). Performed plant operations assessments to develop performance standards, problem and trend analyses, and corrective actions. Developed technology for process and facility improvements. Provided limited operation of T Plant for equipment decon and repair and PUR Core II storage.	operations assessments to develop performance standards, problem and trend analyses, and corrective actions. Support facility integration activities associated with technology studies, testing and process improvements, including CEPCD demonstration and terminal cleanout development. Limited operation of T Plant for equipment decon and repair and PUR Core II storage. Support site service burdens resulting from placing N Reactor in cold standby.	operations assessments to develop performance standards, problem and trend analyses, and corrective actions. Initiate technology studies for process improvements. Exchange technology between Hanford and Los Alamos. Accelerate Terminal Cleanout (TCO) technology development. Full operations at T Plant.
	$ 11,294	$ 20,298	$ 16,912
(Savannah River)	A power facility maintenance program was initiated. The power facilities are in excess of 35 years old and are in need of enhanced maintenance for powerhouse instrumentation upgrades, distribution system upgrades, transformer replacement and spares and overall facility modernization to ensure continued operability and reliability. Areas of priority were characterized this year. Preconceptual design and studies for power facility replacement were initiated.	The power facility maintenance program will continue to be supported at a minimum level. Maintenance tasks that will be started include: reinsulation of steam lines in the 400 and 700 areas; relining of the 308/700 sewage lines; building renovations for power personnel; roof replacement; and labelling of valves and controls throughout the major power facility (4840).	The power facility maintenance program will be supported at optimum levels. Funding will support continuance of maintenance tasks begun in FY 1990 as well as providing for necessary equipment overhauls, boiler maintenance and turbogenerator overhauls.
	The efforts to enhance the technical oversight capabilities of SR Operations Office personnel, funding was used to provide technical support services to assist SR staff in review and analysis of revised startup procedures, training and procedures, operational readiness reviews, reactor operations	SR staff will continue to obtain technical assistance in the form of technical support services at prior year levels. The ESH&QA Division will be supported at FY 1989 staffing levels and hiring of additional qualified personnel will be deferred until FY 1991.	Technical support services will be increased to provide SR staff support in the following areas: monitor and assist in technical management of reactor operations through use of experienced senior reactor engineers; technical analysis of reactivity control technical specifications and procedures; technical analysis of

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Savannah River) (cont'd)	monitoring as well as providing commercial reactor expertise. The Westinghouse Savannah River Company established a new ES&HQA Division when it became the operating contractor at SRS. This new organization is intended to centralize the responsibility for several special programs for the site including; environmental, health protection, safety, quality assurance, analytical laboratories, safeguards and security and medical. Due to a lack of personnel to staff this new organization a major hiring program was implemented to obtain experienced personnel with the unique qualifications required by the ES&HQA programs.		reactor core power distribution specifications; technical analysis of link between technical specifications and observable reactor parameters; review of contractor training program; development and implementation of a formal training program for SRO management and technical staff; development of formal procedures for SR operations and oversight activities; technical review of safety analysis report revisions, probabilistic risk assessments, seismic analyses, fire protection analyses; and preparation and review of emergency response procedures. Staffing levels for the ES&HQA Division will continue to grow to coordinate site priorities and insure site progress toward compliance with State and Federal regulations. Hiring requirements for FY 1991 total 129 new personnel with the majority of personnel being directed toward radiation protection, increasing operational coverage of existing facilities and implementing a radiation work permit system.
	Project management of the large number of capital projects underway at SRS was performed.	Supports minimum levels of project management support for ongoing capital projects will be performed.	Adequate support of project management functions will continue with emphasis on clear assignment of project management responsibilities; establishment of integrated schedules for design, construction, and procurement; establishment of schedule resource loadings; performance of monthly variance analysis; routine performance of detailed estimates at various

.II. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Savannah River) (cont'd)			stages of project life. In addition, continued support will be provided for enhanced systems engineering activities to improve the quality and content of preconceptual designs and improve technical oversight of project progress.
	Funding for contractor transition from Du-Pont to Westinghouse was provided. This included funding for overlap of Westinghouse management personnel while DuPont was still operating contractor. Funding for a 6-month award fee for the new contractor was made available.	A full year award fee, $15 million, is made available. Minimal post transition costs and post employment benefit cost stock options are provided.	A full year award fee, $16 million, will be made available. Minimal post transition costs will be provided.
	Long-range planning studies, site cleanup and warehousing of supplies and equipment were provided. Decommissioning of the F&H area seepage basin was completed. In addition, land management, deer control, and ADP services were provided. A lease to ownership agreement was initiated this year for a Category R processor, payments will be completed in FY 1992.	Long range planning, site cleanup and warehousing are continued at levels necessary to fully meet plant requirements. Land management, deer control and ADP services continue to be provided. The second year of lease to ownership payments for the Category R processor will be made.	Long range planning, site cleanup and warehousing activities are continued at levels necessary to fully support plant requirements. Land management, deer control and ADP services continue to be provided. The third year of lease to ownership payments for the Category R processor will be made.
	$127,660	$101,425	$118,659
(Headquarters/ Miscellaneous)	Provide for miscellaneous support and support contracts.	Provide for miscellaneous support and support contracts.	Continues to provide miscellaneous support.
	$ 2,685	$ 7,081	$ 5,051
Subtotal, Miscellaneous Activities	$142,434	$137,628	$147,484
Conceptual Engineering (Oak Ridge)	The majority of the funding in this category was spent for the preparation of the design criteria for the ES&H FY 1990	Supports the design criteria for the majority of the ES&H FY 1991 subprojects which include HVAC improvements, fire protection	GPP, CE, and Facilities Maintenance project authorization costs will be supported.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Oak Ridge) (cont'd)	subprojects. Included are several dust collectors, and an HVAC system. Costs to prepare Project Authorizations for GPP, CE, and Facilities Maintenance were incurred at reduced scopes.	upgrades, and waste handling facilities. Engineering costs for GPP, CE, and Facilities Maintenance projects will also be supported.	
	$ 4,209	$ 2,719	$ 800
(Idaho)	Performed conceptual designs and engineering studies for capital equipment, general plant projects (GPP) and line-item construction projects. Activities included feasibility studies, conceptual design plans, design criteria, A-E liaison, scope of work statements, project management plans, trade-off studies, cost estimates, etc. Conceptual engineering was also performed (in addition to GPP and capital equipment projects) on the Fluorinel Dissolution Process (FDP) Upgrade project. Two upgrade options are being evaluated. The first utilizes a proven soluble poison concept and the second utilizes an unproven geometrically favorable dissolver concept. Performed advanced conceptual design for the Fire Protection Upgrade project. Performed feasibility studies for the Fuel Canning Station.	Continue conceptual designs and engineering studies on capital equipment, GPP, and FDP Upgrade project. Complete conceptual design for the FDP Upgrade project, soluble poison option, and begin advanced conceptual design if this is the chosen option. Revised level funding permits compliance with environmental, safety and health (ES&H) requirements including DOE Order 5480.11. This also enables the ICPP to: increase efforts to define functional design criteria and the prepare conceptual designs for ES&H upgrade projects; expand the ICPP probabilistic risk assessment (PRA) program; and increase efforts to identify long-term pollution control requirements and required facility upgrades.	Continue conceptual designs and engineering studies on capital equipment, GPP, and FDP upgrade. If the geometrically favorable dissolver proves feasible, it will replace the soluble poison option and advanced conceptual design will begin. In this case, work on the soluble poison option would be terminated. Continue to upgrade programs and facilities at the ICPP to comply with ES&H requirements.
	$ 1,550	$ 4,985	$ 5,[illegible]70
(Richland)	Prepared engineering studies, functional design criteria and conceptual design reports for projects and CEWRTC. Provide conceptual designs for current year and outyear GPPs, candidate line items and CEWRTC. Completed	Provide conceptual designs for current year and outyear GPPs, candidate line-items and CEWRTC.	Provide conceptual designs for current year and outyear GPPs, candidate line-items and CEWRTC.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Richland) (cont'd)	the conceptual design report for processing FFTF fuel in PUREX.		
	$ 8,000	$ 3,331	$ 2,400
(Savannah River)	This category provides for conceptual design in support of the GE program line-item construction, capital equipment, and GPP projects. Included are engineering and other studies and evaluations to assist in establishing basic data for new project facilities, preparation of scopes of work, site exploration, budget estimates and other project support data. A portion of the funding for this activity was to support the establishment of departments within the contractor Project Management System. Some of these were for facilities projects, investment engineering and the capital budgeting department.	Continues to support the essential engineering activities and program for line-item construction, capital equipment, and GPP projects. Maintenance of newly established departments under the new contractor.	Continues to support newly established conceptual engineering functions in FY 1989 and FY 1990. In addition, funding request supports budget estimates updates and alternative studies for essential new FY 1992 to FY 1994 construction projects will be reviewed and analyzed for efficiency, productiveness, and cost benefit.
	$ 14,300	$ 16,843	$ 20,600
Total, Conceptual Engineering	$ 30,059	$ 27,875	$ 28,850
Inventories (Idaho)	Continued to provide essential spares to plant production operations in order to preclude unnecessarily long down-time resulting from failure of plant systems, components and equipment. Began procurement of some FPR long-lead engineered spares as it was advantageous and economical to purchase some spares from the same vendor at the same time the original components were purchased to ensure availability and replaceability.	Continues to provide essential spares to plant production operations to ensure availability of long-lead, difficult-to-obtain spares when needed.	Continues to provide essential spares to plant production operations to ensure availability of long-lead, difficult-to-obtain spares when needed. These spares will preclude unnecessarily long-down-time resulting from failure of plant systems, components and equipment. Increase procurement of FPR long-lead engineered spares consistent with the concept of purchasing spares at the same time the original components are purchased.
	$ 380	$ 433	$ 790

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Oak Ridge)	Continued to provide process spares and common use stores inventories for operation of processing facilities.	Continue to provide process spares and common use stores inventories.	No activity.
	$ (560)	$ (149)	$ 0
(Richland)	Continued to provide process spares and common use stores inventories for operation of processing facilities.	Continue to provide process spares and common use stores inventories.	Provides adequate inventory of spares to support and improve operational efficiency.
	$ (255)	$ 217	$ 928
(Savannah River)	Maintained essential levels of common use stores and process spares in support of plant operations. Adequate levels of such inventories are essential to the continued uninterrupted operation of plant facilities, such as the processing canyons.	Inventory levels will essentially be maintained at FY 1989 levels, with a slight decrease for heavy water.	Continues growth in inventories to support continued, safe, SR plant operations.
	$ 6,700	$ 492	$ 9,400
Total, Inventories	$ 6,265	$ 993	$ 11,116
Total, Supporting Services	$257,959	$232,728	$302,043

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR MATERIALS PRODUCTION

1. Preface: Program Direction

Based on Administration guidance, the Office of Nuclear Materials Production (NMP) has included an additional 56 federal personnel in the budget submission for FY 1990 and FY 1991. These staff are located at the Idaho, Oak Ridge, and Richland Operations Offices, and are direct support staff to the NMP program.

In addition, NMP has been instructed to transfer 40 federal personnel currently budgeted at the Savannah River Operations Office from NMP to the Office of Environmental Restoration and Waste Management, also at the Savannah River Operations Office.

The program direction account provides for salaries, benefits, contractual services, and travel for federal personnel located at Germantown, Maryland, and in Washington, D.C., as well as at four Operations Offices: Idaho; Oak Ridge (Feed Materials Production Center (FMPC), Fernald, Ohio); Richland, Washington; and Savannah River Site (South Carolina).

The Idaho Operations Office is responsible for the direction and oversight of the Nation's processing of Naval nuclear propulsion fuels and thus closes the Navy's fuel cycle while providing fuel for the Department's production reactors. A part of this mission is the Fuel Processing Restoration (FPR) project being constructed under the direction and supervision of the Idaho Operations Office.

The federal staff located at the FMPC provides oversight to the operation of the FMPC, which has historically provided uranium metal to the reactors at Richland, Washington, and to the Savannah River reactors, as well as depleted uranium derbies to the weapons program.

The staff located at Richland, Washington is responsible to the support for the operation and/or maintenance of multiple NMP facilities in varying stages of standby, shutdown, or operation. These facilities include the N Reactor, the Plutonium Uranium Extraction Facility (PUREX), T Plant, and the Plutonium Finishing Plant (PFP).

The Savannah River Operations Office is responsible for the direction and oversight of the various defense and nondefense programs: Nuclear Materials Production, Weapons Activities, Defense Waste and Environmental Restoration, Naval Fuel Materials Facility, Biological and Environmental Research, Energy Conservation (Atlanta Support Office), and other minor programs, e.g., Advanced Nuclear, Basic Energy Science, etc. The principal goal of the defense activities is to provide the necessary nuclear materials and weapons components for the Nation's defense programs, fuel material for the Naval Nuclear Propulsion Program, and to provide for safe treatment, storage, and disposal of nuclear waste.

The Headquarters staff is responsible for direction, management, and overall support of the Nuclear Materials Production program. This includes such activities as the development of program goals, objectives, and plans consistent with Administration policy; formulation, and justification of the proposed budgets and program initiatives to the Office of Management and Budget (OMB) and the Congress; performance of management and technical reviews, safety evaluations and other studies, analyses, and evaluations to assure program accomplishments, to continually optimize technical, managerial and economic aspects of the programs, and to assure effective, efficient, safe, secure, and environmentally-acceptable program operation; and coordination of the program with other agency programs, other Federal agencies, the OMB, the Congress, the United Kingdom and other allies, field offices, and numerous contractors.

II. A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request	% Change
Idaho	$ 655	$ 886	$ 1,000	13%
Oak Ridge	0	0	1,400	100%
Richland	0	0	2,500	100%
Savannah River	28,433	30,166	29,000	-4%
Headquarters	3,315	3,684	8,600	133%
Total	$ 32,403	$ 34,736	$ 42,500	22%

II. B. Major Laboratory and Facility Funding

Not applicable.

III. Activity Description: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Program Direction			
(Idaho)	Provides salary benefits, contractual services, and travel costs for 10 FTE's.	Provide salary, benefits, contractual services, and travel for 13 FTE's.	Provide salary, benefits, contractual services, and travel for 14 FTE's.
	$ 655	$ 886	$ 1,000
(Oak Ridge)	Personnel funded in FY 1989 by the Office of Management and Administration.	Personnel funded in FY 1990 by the Office of Management and Administration.	Provides salary, benefit, contractual services and travel for 20 federal employees at the FMPC.
	$ 0	$ 0	$ 1,400
(Richland)	Personnel funded in FY 1989 by the Office of Management and Administration.	Personnel funded in FY 1990 by the Office of Management and Administration.	Provides salaries, benefits, travel and contractual services for 29 federal employees.
	$ 0	$ 0	$ 2,500
(Savannah River)	Provided salary and benefit costs, contractual services, and travel for 351 FTE's.	Provides salaries, and benefits, travel, and contractual services for 342 FTE's. Provide contractual services and supplies for Weapons and Energy Conservation Programs as well as	Provides salaries, benefits, travel, and contractual services for approximately 342 FTE's. Provides contractual services and supplies as in FY 1990.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Savannah River) (cont'd)		for employees in Inspector General's Office, GAO, Corp of Engineers and support service contractors. Assumes a transfer of 40 FTE's to the Office of Environmental Restoration and Waste Management.	
	$ 28,433	$ 30,166	$ 29,000
(Headquarters)	Provided salary and benefit costs, contractual services and travel for 47 FTE's.	Includes salary and benefit costs, contractual services and travel for 53 FTE's. The current level planned for FY 1991 for Headquarters staffing is 101 FTE's. The additional 48 FTE's are required for the following activities: o Oversight of 40 nuclear production facilities exclusive of the Savannah River reactors. o Oversight of 10 technical safety appraisals and 10 planned safety analysis reports. o Staffing support from the Office of Savannah River Reactor Restart Office (SRRO). The SRRO provides coordination and independent technical review in the safe and timely restart of the nuclear materials production reactors at the Savannah River site. o In-depth reviews of 50-75 Facility Safety Analysis Reports, Technical Specifications and Operating Safety Reports.	Provide salary and benefit cost, contractual services and travel for 121 FTE's. Increase of 20 FTE's to support project management; environmental, safety and health responsibilities for the Department; materials management functions; and support for reactor restart office activities.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
(Headquarters) (cont'd)		• Oversight responsibilities to assure compliance with Environmental, Safety and Health regulations. • Compliance with DOE Order 5660.1 for overview of field office materials management activities. • New construction project starts with an estimated cost of $614 million. • Compliance with DOE Order 4700.1, Project Management.	
	$ 3,315	$ 3,684	$ 8,660
Total, Program Direction	$ 32,403	$ 34,756	$ 42,500

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR MATERIALS PRODUCTION

I. Preface: Enriched Material

Estimates for enriched uranium are provided by the Office of Uranium Enrichment. The Naval Reactors program uses enriched uranium for fabrication of naval reactor cores.

II. A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request g/	% Change
Naval Reactor Program Support	$ 169,000	$ 166,366	$ 176,901	+6%
Total, Uranium Enriching	$ 169,000	$ 166,366	$ 176,901	+6%

II. B. Major Laboratory and Facility Funding

Martin Marietta-Portsmouth	$ 169,000	$ 166,366	$ 176,901	+6%

III. Activity Description: (Bow BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Uranium Enriching			
Naval Reactor Program Support	Provides enriched uranium to continue support of the Naval Reactor fuel production facilities.	Continues to provide support for Naval Reactor Operations enriched uranium requirements.	Continues to provide support for Naval Reactor Operations enriched uranium requirements.
	$169,000	$166,366	$176,901 g/
Total, Uranium Enriching	$169,000	$166,366	$176,901

g/ Funding requirements for enriched uranium for Naval Reactors program support are currently under review.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR MATERIALS PRODUCTION

I. Preface: Capital Equipment

The importance of an adequate capital equipment program to the continued operation of a viable nuclear materials production complex cannot be overlooked. There is a continual process of balancing equipment needs based on the continued requirement to meet production demands within finite funding. Wherever possible, duplicate facilities were shutdown and equipment was cannibalized to save money and to keep other operating facilities on-line. We must continue to rely on currently available facilities for many years in the future.

The reactor, processing and other supporting operations utilize large, unique and expensive items of equipment. Generally, replacement equipment is not readily available "off the shelf". Instead, equipment must be fabricated onsite or designed, procured, installed and integrated into existing process systems. Many large pieces of equipment require 1 year or more lead time to procure the unique material and several months to fabricate. In such cases, extended downtime of critical facilities would be experienced without continual procurement and fabrication of material and equipment. Because of high radiation levels and corrosive environments, replacement equipment must be specifically designed for remote in-place maintenance and removal and made of expensive corrosion-resistant materials.

The Nuclear Materials Production complex continues to identify increases in capital equipment requirements related to safety and health activities. The basic design of many of our facilities reflect standards of the late 1940's through 1960's. Presently, more stringent ES&H regulations and standards, as well as safeguards and security requirements driven by increased worldwide terrorism, are forcing dramatic upgrades to our facilities.

II. A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request	% Change
Reactor Operations	$ 31,799	$ 37,544	$ 31,488	-16%
Processing of Nuclear Materials	37,812	36,141	45,434	26%
Supporting Services	26,670	26,859	28,700	7%
Total, Capital Equipment	$ 96,281	$ 100,544	$ 105,622	5%

II. B. Major Laboratory and Facility Funding

Program Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request	% Change
Feed Materials Production Center (FMPC)	$ 8,843	$ 8,004	$ 5,198	-35%
Idaho National Engineering Laboratory	6,982	8,500	8,000	-6%
Laurence Livermore National Laboratory	377	1,969	0	-100%
Los Alamos National Laboratory	1,925	985	895	-9%
Martin-Marietta (Y-12)	1,702	2,229	3,100	39%
Oak Ridge National Laboratory	190	203	300	48%
San Francisco	224	0	0	0%
Westinghouse Savannah River Company	62,253	65,997	77,819	18%
Westinghouse Hanford Company	13,739	12,657	9,310	-26%
Germantown-(HQ)	46	0	1,000	100%

III. Activity Description: (Row BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Reactor Operations	Provided for design, purchase, fabrication and installation of capital equipment items with emphasis on worker health and safety and environmental monitoring at FMPC. Replaced deteriorated process electrical system and upgraded hoods for enhanced radiation protection at the Y-12 Plant. Provided replacement pumps, motors, valves, monitoring equipment and tanks as required to complete certain safety enhancements and place the N Reactor and related facilities at the Hanford site in safe standby mode. Major equipment tasks at SRS included the replacement of process water pumps and motor lube system, upgrade of emergency GH diesel generator, upgrade central reactor cooling water system, replacement of acid	Equipment tasks at FMPC will continue to focus on worker health and safety and environmental monitoring improvements. Equipment at Y-12 will be directed to bringing the 9206 uranium recycle facility into compliance with DOE radiation protection orders. Specific equipment tasks are: provide a glovebox housing and associated equipment to tear down and process HEPA filters, an organic solvent cleanup system, bulk organic solvent equipment, and upgrade and enclosure of denitrators. No new equipment funding has been identified at the Hanford site since the N Reactor will be maintained in a standby condition. Priority equipment tasks planned for SRS include: fourth	Continue support for FMPC worker health and safety and environmental monitoring equipment requirements. Equipment requirements at Y-12 support radiation protection, compliance with air and water effluent regulations, and corrective actions resulting from technical safety appraisals. Priority equipment items include: personnel monitors to improve contamination control, replacement of secondary extraction system to enhance radiation protection, installation of a water effluent monitor to reduce risk of environmental releases, and HEPA filters to contain uranium particles during filter changeouts. Equipment funding at SRS will include: a pump containment storage tank to minimize contamination and potential for

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Reactor Operations (cont'd)	scrubber in fabrication area, pump modifications for Building 107 and improved filtration system in the 300 area.	additional system improvements to the reactor emergency cooling system, press alignment improvements in the fabrication area, training equipment, modification to rod equipment room controls, personnel decontamination monitors in all reactors, sump water diversion valves, halon control system improvements, and process pump and motor temperature alarms.	environment release, essential battery test capability, replacement of heavy water rework process pumps, replacement of autoclave control systems, replacement of heating and ventilation stem coils, assembly area monitoring and reactor outlet nozzle inspection equipment.
Total Reactor Operations	$ 31,799	$ 37,544	$ 31,488
Processing	Capital equipment at ID supported continued uranium recovery operations and ESAA improvements. Priority items of equipment procured or fabricated included; replacement of a mass spectrometer to support testing of increased throughput, upgrade of criticality alarm system in the shielded area of the plant to reduce risk to worker health and safety, and upgraded the dissolver pilot plant to test options for increased throughput. Other items of equipment provided included pumps, blowers, motors, compressors, air monitors, and air samplers. At OR, handling equipment needed to support the Cf-252 program will be replaced. No capital equipment funding was allocated to the Y-12 plant. At Hanford equipment requirements for pumps, motors, valves,	Continue support of ID processing operations with priority equipment including; replacement of process and laboratory building air supply unit (original equipment installed in 1951) to provide adequate heating, cooling and contamination containment and installation of new load indicating systems on process cranes to avoid load hang-ups and improve operating efficiency. Other items of equipment continually being replaced include pumps, blowers, motors, compressors and air monitors and samplers. Equipment funding at OR will permit the procurement of a thermal neutron counter, a welding power supply and a helium leak detector in support of Cf-252 processing operations. No equipment funding is allocated for the Y-12 plant.	At Idaho, items required on a continuing basis to support plant process equipment continue to be supported. Major items of equipment planned include; spare PAR manipulator to avoid unnecessary down times should existing manipulator fail, design and procurement of new Er shipping containers to meet new DOT requirements and insure adequate margin of safety, installation of FDP geometrically favorable verification enclosure to insure FDP upgrade will meet operation goals, replace uranium mass spectrometer to insure adequate sample analysis information is available, and procurement of a neutron shuffler uranium monitor to reduce the risk of operator error and enhance safety of operations. Equipment funding at OR are needed to provide several Cf-252 shipping casks to replace casks which will not be recertifiable.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Processing (cont'd)	monitoring equipment, crane upgrades, process instrumentation, concentrator upgrades, PUREX vessel vent, PFP seismic fan, PRF solvent extraction upgrade, and UO_3 condensate mist eliminator. All these items support the continued safe, sound, operation of the PUREX plant until its mission can be completed. Priority equipment needs funded at SRS included; replacement of furnace power supply in FB-line provision of a spare dissolver for FB-line, replacement of electrical switchgear and transformer in F canyon, replacement of mercury pumps in H canyon, and provision of spare agitators and canyon pumps.	At Hanford, an equipment program to support the continued operation of PUREX will be carried out. In addition, priority will be given to provision of an Np assay hood, a process spectrophotometer, ventilation control board upgrade, 241-Z waste tank replacement, z-20 discharge monitoring system and an off-gas scrubber. Priority equipment supported at SRS includes: increased HDR dissolving capacity in FB-line, upgrade to the cold chemical waste collection system in F canyon, process ventilation renovations in H canyon, 50 tank replacement in F canyon, and new vault surveillance system in HB-line. Additional spare equipment will be procured and fabricated to insure continued facility operation.	In addition, new requirements exist in support of heavy actinide processing. Planned equipment purchases would include spare master-slave manipulators and an Alpha containment enclosure. Y-12 has identified new equipment requirements that support compliance with contamination control, accountability and safeguards directives. Planned equipment items include: increase the size and capacity of the process exhaust system to correct contamination control problems, replacement of an NO_x scrubber system to correct environmental problems and installation of a dry vacuum system to aid in cleanup and containment of uranium salvage fines. At Hanford, spare concentrator tube bundles will be provided to avoid prolonged shutdown of PUREX in the event of failure. Real-time process accountability will be provided for both PRF and HMC line. An open loop cooling tower to replace the present 291-Z cooling water system will be provided. An automated access control system to compartmentalize and control access in PFP will be provided. The chemical preparation floor in PFP will be repaired to correct problems caused by acid leakage and resultant corrosion of floor rebar.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Processing (cont'd)			SRS will procure a bicell system for F canyon plutonium nitrate product to eliminate shutdown caused by sampling of individual vessel sampling. Spare process pumps for F and H canyon will be provided, these long-lead items will support the operation of 34 such pumps that fail at an average of one every three months. Mechanical line glove ports will be replaced with an improved design to correct in leakage problems that cause safety concerns. Railroad tunnel monitoring in 221-FH will be upgraded to permit adequate handling, surveying and decontamination of transport boxes to reduce risk of contamination releases.
Total, Processing	$ 37,812	$ 36,141	$ 45,434
Supporting Services	At ID, items requiring continual replacement were provided. In addition, the powerhouse demineralizer unit was replaced to meet current throughput requirements. Corroded piping in the Liquid Effluent Treatment and Disposal system were replaced. Hanford equipment funding provided spare equipment for T-Plant, a patrol team communication, and a transport cask replacement. Major items of capital equipment provided at SRS include: renovation of 772-F analytical	Emission monitors at the Coal Fired Steam Generation Plant will be replaced to correct calibration deficiencies found in current monitors at ID. A space acid fractionator for the liquid effluent treatment and disposal system will be procured to avoid facility shutdowns. A new transformer will be installed to provide for anticipated power needs and emergency situations. A vapor containment system will be installed for a chemical storage tank to eliminate potential HF vapor releases to the environment.	An emergency power generator will be procured at ID to allow compliance with regulations requiring orderly shutdown of radioactive processes in the event of a power failure. The existing walk-in hood in the Hot Chemistry Lab will be replaced to reduce alpha contamination levels. A training simulator to allow continuous hands-on operator training and allow validation of process flowsheets. New Off-gas instrumentation will be procured to provide adequate environmental monitoring in the waste treatment area.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Supporting Services (cont'd)	cells, provision of laundry equipment, separation of wet and dry exhaust systems in 773-A, portal walkthrough monitors and power underground storage tanks.	Hanford equipment funding will support provision of T-Plant spare equipment, T-Plant sludge removal system, additional transport cask, and night vision equipment. Major items of capital equipment at SR will provide: replacement fire truck, replacement of shop maintenance computer, replacement containment units in various buildings, replacement of shielded area exhaust system, and reactor inspection equipment maintenance facility. Upgrade of existing general purpose IBM 3090 computer for $3.5M to accommodate a 35% increase in anticipated administrative computing capacity.	Hanford equipment funding will support safeguards and security requirements including a central badging computer system. Additionally, spare equipment for T-Plant will be procured. At SR the support service capital equipment account generally contains all equipment for the laboratories, power department, vehicles and vehicle maintenance, central shop maintenance, administrative areas, as well as general equipment such as portal monitors, which can be installed in many locations across the plant. Major items of equipment planned include: a fiber optic interface for the plantwide security system to improve essential communications capability, continuation of the effort to replace power underground fuel storage tanks to provide containment and leak detection, installation of a multiplex alarm system in 772-F, H to improve response capabilities, replacement of domestic water and service water storage tanks in F and H areas to meet SCDHEC standards, provision of computer hardware for a boiler training simulator, and initiate installation of sodium hypochlorite and dechlorinator facility to meet SCDHEC regulations. Over 150 separate capital equipment tasks costing over $75,000 have been identified as FY 1991 SR requirements.

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III. Activity Description: (Show $A in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Supporting Services (cont'd)			Includes $4.5M to purchase an IBM 3081 computer to replace existing system installed in FY 1981. This equipment will be used to ensure DHS is able to meet its reliability, disaster support, service level, and computational objectives. Replacement IBM 3083E computer for IBM 3083 for $1M. This new computer will provide operating resources to allow for present user interface for classified and unclassified users. Additionally, operational efficiencies and operational cost will be reduced.
Total Supporting Services	$ 26,670	$ 26,859	$ 28,700
Total, Capital Equipment	$ 96,281	$100,544	$105,622

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR MATERIALS PRODUCTION

I. Preface: Construction

Construction project funding is essential to retain future capability to produce nuclear materials for national security. Many of the Department's materials production facilities are presently experiencing unplanned, extended outages due to widely publicized concerns over personnel, public, and environmental safety. This is a trend which can be expected to continue as ongoing reviews of additional facilities across the complex are concluded. Corrective actions must be initiated immediately to address these urgent problems.

Construction project funding is also necessary to begin a credible effort to bring all of the Department's facilities into compliance with Federal and State environmental regulations; to continue safeguards and security projects to ensure protection of national security installations and valuable nuclear materials; and to ensure long-term technology for reliable continued production of special nuclear materials.

Various projects are required to improve existing facilities or for maintenance and/or upgrade of facilities required for national defense. Many of the production facilities are over 30 years old and require extensive modification or replacement to keep critical production facilities in condition to meet defined mission requirements. Construction projects are proposed to ensure that the long-term mission of the NWP complex can be met.

Environmental projects are those projects that correct and clean up environmental hazards caused by the operation of nuclear materials production facilities. All environmental projects were transferred to the Environmental Management program in FY 1990. Safety and health projects are necessary to provide for preventative upgrades and maintenance. Safeguards and security construction projects are required to protect the operation of key national security nuclear production facilities. The overall safe, secure operation of the NWP complex is crucial, therefore, continuing efforts are being made to permit adequate protection of these major production facilities.

The FY 1991 budget completes closeout of the Special Isotope Separation plant construction activities at Westinghouse Idaho Nuclear Company, Lawrence Livermore National Laboratory, and associated contractors.

II. A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request	% Change
Reactor Operations	$ 17,700	$ 23,526	$ 55,881	138%
Programmatic	0	0	0	0%
Environmental, Safety, and Health	17,700	23,526	55,881	138%
Safeguards and Security	0	0	0	0%
Processing of Nuclear Materials	23,000	43,635	8,500	-81%
Programmatic	23,000	39,400	0	-100%
Environmental, Safety, and Health	0	4,235	8,500	101%
Safeguards and Security	0	0	0	0%
Supporting Services	248,697	261,420	281,127	8%
Programmatic	161,124	195,606	196,344	1%
Environmental, Safety, and Health	52,189	43,276	67,583	49%
Safeguards and Security	35,384	22,538	17,300	-23%
Total, Construction	$ 289,397	$ 328,581	$ 345,508	5%

II. B. Major Laboratory and Facility Funding

Feed Materials Production Center (FMPC)	$ 85,129	$ 62,816	$ 15,273	-76%
Martin Marietta (Y-12)	0	0	2,150	100%
Idaho National Engineering Laboratory	70,900	114,288	99,058	-13%
Lawrence Livermore National Laboratory	4,600	11,346	0	-100%
Los Alamos National Laboratory	1,200	1,181	300	-75%
Westinghouse Hanford Corporation	5,918	7,998	10,651	50%
Westinghouse Savannah River Company	119,650	130,946	218,076	67%
Germantown-Headquarters	0	906	0	-100%

III. Activity Description: (Row BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Reactor Operations			
Programmatic - Construction			
Prior-Year Project	$ 0	$ 0	$ 0
ES&A - Construction			
91-D-148, Reactor Charge/ Discharge Training Simulator, Savannah River (SR)	$ 0	$ 0	$ 2,000
90-D-142, Coal Storage - Facility Environmental Upgrade, FMPC, Oak Ridge	$ 0	$ 906	$ 0
90-D-150, Reactor Safety Assurance, Phase I, SR	$ 0	$ 12,509	$ 32,600
89-D-148, Improved Reactor Confinement System, SR	$ 2,000	$ 6,994	$ 12,800
86-D-152, Reactor Electrical Distribution System, SR	$ 6,000	$ 3,117	$ 0
85-D-145, Fuel Production Facility, SR	$ 9,700	$ 0	$ 8,481
Subtotal, ES&A - Construction	$ 17,700	$ 23,526	$ 55,881
Total, Reactor Operations Construction	$ 17,700	$ 23,526	$ 55,881

III. Activity Description: (Dev BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Processing of Nuclear Materials			
Program - Construction			
86-D-148, Special Isotope Separation Plant, Idaho	$ 23,000	$ 39,400	$ 0
Subtotal, Program - Construction	$ 23,000	$ 39,400	$ 0
ESHA - Construction			
90-D-143, PPP Fire Safety and Loss Limitation, Richland	$ 0	$ 788	$ 2,500
90-D-161, Fire Protection Upgrade, Idaho	$ 0	$ 3,447	$ 6,000
Subtotal, ESHA - Construction	$ 0	$ 4,235	$ 8,500
Total, Processing of Nuclear Materials Construction	$ 23,000	$ 43,635	$ 8,500
Supporting Services			
Program - Construction			
GPS-146, General Plant Projects	$ 30,505	$ 32,283	$ 36,994
91-D-143, Electrical Substation Capacity, Savannah River	$ 0	$ 0	$ 6,000
90-D-151, Engineering Center, Savannah River	$ 0	$ 6,895	$ 4,000
86-D-149, Productivity Retention, Phases I-V, Various Locations	$ 76,640	$ 80,553	$ 61,750
85-D-139, Fuel Processing Restoration, Idaho	$ 50,100	$ 73,675	$ 87,500
Prior Year Projects	$ 5,879	$ 0	$ 0
Subtotal, Program - Construction	$161,124	$195,406	$196,244

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
ES&H - Construction			
91-D-145, New Whole Body Counter Facility, Savannah River	$ 0	$ 0	$ 4,350
90-D-149, Plantwide Fire Protection, Savannah River	$ 0	$ 4,826	$ 49,100
87-D-159, Environmental, Health, and Safety Improvements, Phases I-IV, FMPC, Fernald, Ohio	$ 49,965	$ 40,450	$ 14,133
Prior Year Projects	$ 2,224	$ 0	$ 0
Subtotal, ES&H - Construction	$ 52,189	$ 45,276	$ 67,583
S&S - Construction			
89-D-140, Additional Separations Safeguards, Savannah River	$ 5,300	$ 10,146	$ 16,300
88-D-153, Additional Reactor Safeguards, Savannah River	$ 5,700	$ 6,304	$ 1,000
86-D-156, Plantwide Safeguards Systems, Savannah River	$ 12,800	$ 6,088	$ 0
84-D-134, Safeguards and Security Improvements, Savannah River	$ 11,584	$ 0	$ 0
Subtotal, S&S - Construction	$ 35,384	$ 22,538	$ 17,300
Total, Supporting Services	$248,697	$261,420	$281,127
Total, Construction	$297,922	$306,561	$348,560

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Nuclear Materials Production

IV. A. Construction Project Summary

Project Number	Project Title	Total Prior Year Appropriations	FY 1990 Appropriation	FY 1991 Request	Unappropriated Balance	TEC
GP-0-146	General Plant Projects	$ N/A	$ 32,283	$ 36,994	$ N/A	$ 36,994
91-0-143	Increase Electrical Substation Capacity	0	0	6,000	900	6,900
91-0-145	New Whole Body Counter Facility	0	0	4,350	0	4,350
91-0-148	Reactor Charge/Discharge Training Simulator	0	0	2,000	23,000	25,000
90-0-141	ICPP Fire Protection Upgrade	0	3,447	6,000	13,553	23,000
90-0-142	Coal Storage Facility Environmental Upgrade	0	906	0	0	0
90-0-143	PPP Fire Safety and Loss Limitation	0	788	2,500	12	3,300
90-0-149	Plantwide Fire Protection	0	4,826	49,100	256,074	310,000
90-0-150	Reactor Safety Assurance	0	12,509	32,600	120,791	165,900
90-0-151	Engineering Center	0	6,895	4,000	105	11,000
89-0-140	Additional Separations Safeguards	5,500	10,146	16,300	23,254	55,000
89-0-148	Improved Reactor Containment System	2,000	6,994	12,800	19,706	41,500
88-0-153	Additional Reactor Safeguards	7,600	6,304	1,000	0	14,904
87-0-159	FMPC Environmental Upgrade	94,807	40,450	14,133	1,967	149,390a/
86-0-148	SIS Production Plant	62,811	39,400	0	N/A	N/A
86-0-149	Productivity Retention Program	183,912	80,553	61,750	129,485	455,232
86-0-152	Reactor Electrical Distribution System	17,836	3,117	0	0	20,953
86-0-156	Plantwide Safeguards System	36,319	6,088	0	0	42,407
85-0-139	Fuel Processing Restoration	132,141	73,875	87,500	115,484	409,000
85-0-145	Fuel Production Facility	50,619	0	8,481	12,600	71,700
			$ 328,581	$ 345,508		

a/ Project 87-0-159, FMPC Environmental Upgrade, is split funded with the Office of Environmental Restoration and Waste Management (OERWM).

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Materials Production

IV. B. Plant Funded Construction Project

1. Project GPD-146, General Plant Projects, Various Locations

PROJECT TEC: $36,994
START DATE: 1st Qtr. FY 1991
COMPLETION DATE: 2nd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 36,994	$ 36,994	$ 11,025
1992	0	0	16,600
1993	0	0	9,369

3. Narrative:

This project provides for various items of new construction, additions, alterations, and retirements to the land, buildings, and utility systems at Savannah River, Richland, Idaho, Oak Ridge, and Albuquerque Operations Offices to support program needs in the areas of health, safety, environment, safeguards, general support, materials production program needs, and other program requirements of the Department.

Savannah River	$ 24,495
Richland	4,351
Idaho	5,358
Oak Ridge	2,290
Albuquerque	300
Total Materials Production Program	$ 36,994

4. Total Project Funding (B/O):

Not applicable.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Materials Production

IV. B. Plant Funded Construction Project

1. Project 91-D-143, Increase 751-A Electrical Substation Capacity, Phase I, Savannah River Site, South Carolina

PROJECT TEC: $ 6,900[a/]
START DATE: 2nd Qtr. FY 1991
COMPLETION DATE: 2nd Qtr. FY 1994

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 6,000	$ 6,000	$ 3,000
1992	900	900	2,000
1993	0	0	1,000
1994	0	0	900

3. Narrative:

This project increases the capacity of the electrical substation and power distribution system that services the 300 and 700 Areas of the Savannah River Site from 12.5 million volt amps to 32 million volt amps. The project also restores full supply system redundance in keeping with DOE Order 6430.1A. Specifically, the project will replace existing transformers, cabling and switchgear with larger capacity equipment to handle future loads at Savannah River Site (SRS).

4. Total Project Funding (B/D):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 3,000	$ 3,900
Capital Equipment	0	0	0	0	0
Operating Expenses	1,600	0	0	300	0

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a/ Phase I work only. Phase II is dependent on future Department decisions to conduct experiments at the SRS Heat Transfer Laboratory to support the New Production Reactor (NPR) project. Phase II would provide upgrade and expand the 13.8 kV distribution system to the 300/700 area to handle this additional load. Total cost for all work, Phases I and II, will be approximately $13,500.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Materials Production

IV. B. Plant Funded Construction Project

1. Project 91-D-145, New Whole Body Counter Facility
Savannah River Site, South Carolina

PROJECT TEC: $ 4,350
START DATE: 1st Qtr. FY 1991
COMPLETION DATE: 4th Qtr. FY 1992

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 4,350	$ 4,350	$ 2,400
1992	0	0	1,950

3. Narrative:

This project will provide a new, state-of-the-art Whole Body Counter Facility that will increase, by threefold, the Savannah River Site's routine and emergency capabilities for assessing assimilated radioactive materials. The facility will consist of a 3,200 square-foot building which will contain three shielded rooms, each with radiation detectors and instrumentation. The building will also contain a Fastscan whole body counter, a laboratory, an ultrasound room, an electronics area, and office support facilities.

This project will enable the Site to provide both routine and emergency capability for in-vivo assessment of assimilated radionuclides. DOE Order 5480.11 requires the Site to have a comprehensive radiation monitoring program. The Whole Body Counter Facility is an integral aspect of this program. The present facility is marginally adequate, both in the number of people who can be counted and the frequency of their measurements. By 1992, the present facility will be inadequate to handle the needs of the Site, whose population by then is expected to increase ten percent.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 2,400	$ 1,950
Capital Equipment	0	0	0	0	0
Operating Expenses	170	0	0	0	0

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ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Materials Production

IV. B. Plant Funded Construction Project

1. Project 91-D-148, Reactor Charge/Discharge Training Simulator
Savannah River Site, South Carolina

PROJECT TEC: $25,000
START DATE: 2nd Qtr. FY 1991
COMPLETION DATE: 4th Qtr. FY 1994

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 2,000	$ 2,000	$ 1,600
1992	16,600	16,600	7,800
1993	3,800	3,800	8,500
1994	2,600	2,600	7,100

3. Narrative:

The project will provide a new facility in C Reactor area to train charge and discharge (C&D) machine operators, C&D supervisors and other personnel in all aspects of component handling. A real-time computer controlled simulator will be procured and a mock control room constructed. The simulator will meet the intent of ANSI/ANS-3.5-1985 with the K Area C&D machine system as the reference plant. The new facility will be approximately 24,700 square feet in size and will include both classroom and office space.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 1,600	$ 23,400
Capital Equipment	0	0	0	0	0
Operating Expenses	900	0	0	0	0

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ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Materials Production

IV. B. Plant Funded Construction Project

1. Project 90-D-141, Idaho Chemical Processing Plant (ICPP) Fire Protection, Idaho National Engineering Laboratory, Idaho

PROJECT TEC: $ 23,000
START DATE: 1st Qtr. FY 1990
COMPLETION DATE: 4th Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 3,447g/	$ 3,447g/	$ 2,500
1991	6,000	6,000	4,000
1992	12,000	12,000	10,500
1993	1,553	1,553	6,000

3. Narrative:

This project will correct over 200 fire and life safety code deficiencies recently identified at the Idaho Chemical Processing Plant. The corrections are divided into five major groups: (a) separation of the fire water and the utility water distribution systems; (b) provision of redundant fire water pumps and storage tanks of increased capacity; (c) modifications to the underground fire water distribution system to meet code, capacity, monitoring, supervision, and structural requirements; (d) additions and modifications to the fire suppression systems to meet code requirements; and (e) additions and modifications to ICPP buildings and structures to meet life safety and fire protection codes.

The improvements provided by this project are necessary to bring the ICPP into compliance with the DOE fire protection orders and nationally recognized codes and standards, the scope of the project is based on findings of a recently completed, independent evaluation of the plant's fire and life safety systems.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 2,500	$ 4,000	$ 16,500
Capital Equipment	0	0	0	0	0
Operating Expenses	1,230	0	100	300	570

g/ Reflects a 1-1/2 percent reduction in accordance with the Balanced Budget and Emergency Deficit Control Act of 1985, Public Law 99-177.

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Materials Production

IV. B. Plant Funded Construction Project

1. Project 90-D-143, Plutonium Finishing Plant Fire Safety and Loss Limitation
Richland, Washington

PROJECT TEC: $ 3,300
START DATE: 2nd Qtr. FY 1990
COMPLETION DATE: 1st Qtr. FY 1992

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 788[a/]	$ 788[a/]	$ 430
1991	2,500	2,500	2,100
1992	12	12	570

3. Narrative:

This project will provide alternations to the 234-52 Building at the Plutonium Finishing Plant (PFP) to comply with national standards and Department of Energy regulations pertaining to fire and life safety. Work will include:

- Revised personnel fire escape routes from specific rooms and areas within PFP
- New fire barriers within the PFP
- An automatic fire suppression system for the duct level areas west of column Line 12
- Upgrades to the existing fire alarm system.

4. Total Project Funding (R/D):

Not applicable, Total Estimated Cost less than $5 million.

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a/ Reflects a 1-1/2 percent reduction in accordance with the Balanced Budget and Emergency Deficit Control Act of 1985, Public Law 99-177.

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ATOMIC ENERGY DEFENSE ACTIVITIES
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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Materials Production

IV. B. Plant Funded Construction Project

1. Project 90-D-149, Plantwide Fire Protection, Phases I and II, Savannah River Site, South Carolina

PROJECT TEC: $310,000[a]
START DATE: 1st Qtr. FY 1990
COMPLETION DATE: 3rd Qtr. FY 1997[a]

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 4,826[b]	$ 4,826	$ 3,400
1991	49,100	49,100	39,000
1992	53,974	53,974	42,500
1993	45,600	45,600	43,300
1994	52,500	52,500	53,000
1995	55,000	55,000	60,600
1996	43,200	43,200	56,600
1997	5,800	5,800	11,600

3. Narrative:

This is a multi-phase project to bring fire protection at the Savannah River Site into compatibility with the standards of the National Fire Protection Association and the Life Safety Code. The scope of the project was established through detailed surveys by independent evaluators.

Phase I covers the reactors while Phase II addresses improvements in the separations area and a limited number of smaller tasks in the administration, power, and raw materials areas. It is expected that the costs of all phases will be approximately $500 million.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 3,400	$ 39,000	$267,600
Capital Equipment	0	0	0	0	0
Operating Expenses	2,540	400	5,650	1,150	1,460

[a] Phases I and II only.
[b] Reflects a 1-1/2 percent reduction in accordance with the Balanced Budget and Emergency Deficit Control Act of 1985, Public Law 99-177.

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Materials Production

IV. 6. Plant Funded Construction Project

1. Project 90-D-150, Reactor Safety Assurance, Phases I and II, Savannah River, South Carolina

PROJECT TEC: $165,900[a/]
START DATE: 1st Qtr. FY 1990
COMPLETION DATE: 4th Qtr. FY 1995[a/]

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 12,509	$ 12,509	$ 5,900
1991	32,600	32,600	19,950
1992	60,946	60,946	43,700
1993	50,400	50,400	45,850
1994	9,445	9,445	39,800
1995	0	0	10,700

3. Narrative:

The Reactor Safety Assurance project is a multi-phased effort to bring the safety related systems on P, K, and L Reactors into closer conformity with commercial regulations. Phase I includes: a new isotopic stack monitoring system to more accurately quantify radioactive releases in the event of an accident; additional diesel and lube oil supply tanks to allow extended emergency power operations; upgrading of the electrical circuits that carry power between the remotely located diesel generators and the reactor building; and, new load sequences to prevent the emergency generators from being overloaded during startup.

Phase II encompasses: a fast acting helium-3 injection system capable of reducing reactor power by 35 percent in less than 100 milliseconds and pipe restraints to prevent a dislocation of primary coolant system piping in the event of a full circumferential pipe crack.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 9,000	$ 38,950	$140,050
Capital Equipment	0	0	0	0	0
Operating Expenses	1,010	1,030	1,840	0	0

a/ Phases I and II only.

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Materials Production

IV. B. Plant Funded Construction Project

1. Project 90-D-151, Engineering Center,
Savannah River Site, South Carolina

PROJECT TEC: $ 11,000
START DATE: 1st Qtr. FY 1990
COMPLETION DATE: 4th Qtr. FY 1992

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 6,895a/	$ 6,895a/	$ 1,800
1991	4,000	4,000	4,000
1992	105	105	5,200

3. Narrative:

This project provides an on-site Engineering Center to support the operation of the Savannah River Site.

The Center will consist of a 3-story, 100,000 square building located on undeveloped segment of B-Area. It will be designed to accommodate approximately 540 Westinghouse Savannah River Corporation (WSRC) Engineering and Projects Division employees and 60 associated Department of Energy personnel.

An "office landscaping" approach will be utilized to hold down cost; however, individual offices will be provided for supervisors.

The building will have structural steel framing, concrete slab floors on metal decking, and minimal maintenance exterior curtain walls. The roof will be a ballasted single-ply membrane on rigid insulation. Windows will be fixed, reflective insulating glass in aluminum frames.

A variable volume air distribution system will be utilized with chilled water cooling and hot water heating. A new cooling tower will be installed and connections made to existing domestic water, sanitary sewer, electric power, and fire protection utility lines.

a/ Reflects a 1-1/2 percent reduction in accordance with the Balanced Budget and Emergency Deficit Control Act of 1985, Public Law 99-177.

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IV. B. Plant Funded Construction Project

1. Project 90-D-151, Engineering Center,
Savannah River Site, South Carolina

4. Total Project Funding (B/D):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 1,800	$ 4,000	$ 5,200
Capital Equipment	0	0	0	0	0
Operating Expenses	200	0	0	0	6,000

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Materials Production

IV. B. Plant Funded Construction Project

1. Project 89-D-140, Additional Separations Safeguards, Savannah River Site, South Carolina

PROJECT TEC: $ 55,800
START DATE: 2nd Qtr. FY 1989
COMPLETION DATE: 3rd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1989	$ 5,300	$ 5,300	$ 460
1990	10,146[a/]	10,146[a/]	8,600
1991	16,300	16,300	18,700
1992	10,454	10,454	14,340
1993	12,800	12,800	12,980

3. Narrative:

This project will further upgrade the security in the Separations Areas by providing Protected Areas for the 221-F and 221-H Canyon buildings and by installing additional automated access control devices in both canyon buildings.

The additional systems will provide early detection and assessment of an outsider adversary attempting to breach Material Access Areas located in each canyon building that contains special nuclear material, without significantly increasing the number of security personnel used for surveillance and protection of Savannah River Site Separations Areas facilities. The FY 1991 funding will be used to continue construction and procurement activities.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 460	$ 8,600	$ 18,700	$ 27,200
Capital Equipment	0	0	0	0	0
Operating Expenses	2,195	125	150	200	450

a/ Reflects a 1-1/2 percent reduction in accordance with the Balanced Budget and Emergency Deficit Control Act of 1985, Public Law 99-177.

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Materials Production

IV. B. Plant Funded Construction Project

1. Project 89-D-148, Improved Reactor Confinement System, Savannah River Site, South Carolina

PROJECT TEC: $ 41,500[a/]
START DATE: 1st Qtr. FY 1989
COMPLETION DATE: 4th Qtr. FY 1994[a/]

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1989	$ 2,000	$ 2,000	$ 59
1990	6,994[b/]	6,994	1,200
1991	12,800	12,800	9,000
1992	11,100	11,100	14,000
1993	6,500	6,500	11,500
1994	2,106	2,106	5,741

3. Narrative:

This project will provide a buffered water spray system to cope with the postulated heat loads in the reactor room during a severe core melt. It will ensure that P Reactor will meet 10 CFR 100 siting guides for offsite thyroid dose and will reduce the dose rate for onsite and offsite personnel by at least 40 percent. The spray system will be automatically actuated in the event of a core melt accident and will be capable of delivering 2,500 gallons per minute from four new 50,000-gallons water tanks. The water will flow, via gravity feed, to 76 spiral spray nozzles placed at two elevations in the reactor room. The buffered spray water will last for 20 minutes. After this time, if it is necessary, the existing emergency spray system can be manually started to provide additional water for the remainder of the time necessary to mitigate the accident.

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a/ Project scope, schedule, and cost are being reevaluated and are expected to change. Updated information will be provided in conjunction with the Department's FY 1991 budget testimony.

b/ Reflects a 1-1/2 percent reduction in accordance with the Balanced Budget and Emergency Deficit Control Act of 1985, Public Law 99-177.

IV. B. Plant Funded Construction Project

1. Project 89-D-148, Improved Reactor Confinement System, Savannah River Site, South Carolina

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 59	$ 1,200	$ 9,000	$ 31,241
Capital Equipment	0	0	0	0	0
Operating Expenses	2,000	0	0	0	0

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Materials Production

IV. B. Plant Funded Construction Project

1. Project 88-D-153, Additional Reactor Safeguards, Savannah River, South Carolina

PROJECT TEC: $14,904[a/]
START DATE: 3rd Qtr. FY 1988
COMPLETION DATE: 3rd Qtr. FY 1992

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1988	$ 1,900[b/]	$ 1,900[b/]	$ 27
1989	5,700	5,700	2,458
1990	6,304[c/]	5,304[c/]	6,315
1991	1,000	1,000	5,104
1992	0	0	1,000

3. Narrative:

This project upgrades and consolidates the entry control systems at P, K, and L Reactors. Additional surveillance devices and alarms will be installed to limit access to both the reactor areas and vital interior rooms. Entry points and passageways will also be hardened against forced entry.

The improvements are required to satisfy increased detection, assessment, and access control requirements. The changes will enhance the Department's ability to restrict building and vital area access to authorized personnel only. The FY 1991 funds will be used to complete construction.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 27	$ 2,458	$ 6,315	$ 5,104	$ 0
Capital Equipment	0	0	0	0	0
Operating Expenses	931	150	150	0	0

a/ Project cost and schedule are being adversely impacted by concurrent reactor restart activities. A revised estimate and end date will be provided in conjunction with DOE's FY 1991 Congressional hearings.
b/ $1,000,000 of original FY 1988 appropriation reprogrammed to operating expenses to support Savannah River requirements.
c/ Reflects a 1-1/2 percent reduction in accordance with the Balanced Budget and Emergency Deficit Control Act of 1985, Public Law 99-177.

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Materials Production

v. B. Plant Funded Construction Project

1. Project 87-D-159, Environmental, Health, and Safety Improvements, Phases I, II, III, IV, and V, Feed Materials Production Center, Fernald, Ohio

PROJECT TEC: $149,390 a/ b/
START DATE: 2nd Qtr. FY 1987
COMPLETION DATE: 4th Qtr. FY 1994

2. Financial Schedule: c/

Fiscal Year	Appropriation	Obligations	Costs
1987	$ 9,842	$ 9,842	$ 3,100
1988	35,000	35,000	13,350
1989	49,965	49,965	29,537
1990 d/	40,450	40,450	22,766
1991	14,133	14,133	40,641
1992	0	0	28,400
1993	0	0	10,596
1994	0	0	1,000

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a/ Funding requests for Nuclear Materials Production activities only are associated with this line item. Separate construction project data sheets are submitted reflecting funding profiles of Corrective Activities and Environmental Restoration portions of this project.

b/ Estimate for Phases I, II, III, IV, and V based on completed conceptual design, partial definitive design, and partial construction. The current estimate and schedule reflect reevaluation/consideration of: the projected impacts of Hanford's N Reactor shutdown and other reduced FMPC production levels which resulted in project cost decreases; ultimate disposal of construction waste and contaminated rubble which resulted in project cost increases; deferral of subprojects which resulted in increased escalation costs; and restructuring the project activities between the Nuclear Materials Production program activities and the Environmental Restoration and Waste Management plan activities.

c/ Funding requirement for Phases I, II, III, IV, and V. Additional funding in FY 1992 will be required for Phase VI.

d/ Reflects a 1-1/2 percent reduction in accordance with the Balanced Budget and Emergency Deficit Control Act of 1985, Public Law 99-177.

IV. B. Plant Funded Construction Project (continued)

1. Project 87-D-159, Environmental, Health, and Safety Improvements, Phases I, II, III, IV, and V, Feed Materials Production Center, Fernald, Ohio

3. Narrative:

In August 1989 the Department of Energy published the Environmental Restoration and Waste Management Five-Year Plan. As a part of that plan, the Fernald Feed Materials Production Center (FMPC) identified several subprojects which were currently included within this construction project but were more appropriately as corrective activities, as well as subprojects which should be funded under the Environmental Restoration Program.

Activities which were segregated and transferred to the Environmental Restoration and Waste Management program are those which are required as a result of the Clean Air Act; the Clean Water Act; Ohio Air and Water Pollution Control Regulations; the Resource Conservation and Recovery Act; the Comprehensive Environmental Response, Compensation, and Liability Act; the Toxic Substance Control Act; Ohio Hazardous Waste Regulations; and compliance agreements with the State of Ohio.

Activities which remain within the Nuclear Materials Production's programs responsibilities include improvements necessary for FMPC worker and community health and safety, including contamination control, alarm and detector system upgrades, ventilating system upgrades, storage warehouses, and fire protection measures.

This project provides a series of improvements that will reduce hazardous discharges from the FMPC and ensure that plant operations do not pose a threat to the environment, the community, or the work force. This multi-phase improvements project will assure the environmentally safe operation of FMPC to produce depleted uranium metals for the DOE complex. Major improvements are planned for air quality control systems, water quality control systems, improvements to contamination control, reduction of radiation exposure to workers and enhancement of alarm and warning systems.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 16,450	$ 29,537	$ 22,766	$ 40,641	$ 39,996
Capital Equipment	0	0	0	0	0
Operating Expenses	10,170	3,100	3,000	1,500	500

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Materials Production

IV. B Plant Funded Construction Project

1. Project 86-D-149, Productivity Retention Program, Phases I-VI
Various Locations

PROJECT TEC: $455,232[a/]
START DATE: 1st Qtr. FY 1986
COMPLETION DATE: 2nd Qtr. FY 1996

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1986	$ 19,600	$ 19,600	$ 6,162
1987	44,512	44,512	25,204
1988	45,160[b/]	45,160	28,799
1989	74,640[c/]	74,640	41,779
1990	80,553[d/]	80,553	53,950
1991	61,750	61,750	69,700
1992	52,800	52,800	68,100
1993	35,655	35,655	61,300
1994	21,550	21,550	52,200
1995	12,912	12,912	39,850
1996	1,100	1,100	8,188

3. Narrative:

This project provides for a series of improvements that will increase the operating availability or efficiency of critical production components. The need for such improvements is driven by: (1) nuclear materials production losses that have been incurred because of the safety-related plant shutdowns that have occurred over the past 2 years; (2) declines in production capability due to aging; (3) more stringent environmental release and radiation exposure standards which have come into effect over the past several years; and (4) the increased need for cost-effectiveness. Twenty-five individual subprojects are included in Phases I-VI.

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a/ Change results from the addition of Phase VI, the further deletion of tasks at the Feed Materials Production Center, and various individual subproject cost adjustments.
b/ Reflects approved FY 1989 reprogramming of $+2,500,000.
c/ Reflects approved FY 1988 reprogramming of $-10,000,000.
d/ Reflects a 1-1/2 percent reduction in accordance with the Balanced Budget and Emergency Deficit Control Act of 1985, Public Law 99-177.

IV. B. Plant Funded Construction Project (continued)

1. Project 86-0-169, Productivity Retention Program, Phases I-VI
Various Locations

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 60,165	$ 41,779	$ 53,950	$ 69,700	$229,638
Capital Equipment	6,250	0	0	0	0
Operating Expenses	39,103	2,690	3,435	2,795	1,100

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Materials Production

IV. B. Plant Funded Construction Project

1. Project 85-D-139, Fuel Processing Restoration
Idaho Chemical Processing Plant,
Idaho National Engineering Laboratory, Idaho

PROJECT TEC: $409,000[a/]
START DATE: 2nd Qtr. FY 1985
COMPLETION DATE: 4th Qtr. FY 1994

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1985	$ 10,000	$ 10,000	$ 8,221
1986	13,530	13,530	13,498
1987	30,511	30,511	13,777
1988	28,000	28,000	15,779
1989	50,100	50,100	28,222
1990	73,875	73,875	56,244
1991	87,500	87,500	87,500
1992	63,000	63,000	82,630
1993	40,484	40,484	69,750
1994	12,000	12,000	27,862
1995	0	0	5,317

3. Narrative:

The Fuel Processing Restoration (FPR) project will replace the 30-year old deteriorated uranium recovery process at the Idaho Chemical Processing Plant (ICPP) and provide a new low-level liquid waste treatment and disposal system. The FPR project is required to process the projected increases in Naval fuel receipts and meet today's standards for radiation exposure, radioactive waste management, criticality control, physical security, and materials accountability.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 51,275	$ 28,222	$ 56,244	$ 87,500	$185,759
Capital Equipment	0	0	400	440	1,325
Operating Expenses	29,206	3,759	4,096	4,966	44,219

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a/ Project TEC has increased as a result of unfavorable cost trends which have drawn down contingency and higher than expected bids on the first major construction contract.

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Materials Production

IV. B. Plant Funded Construction Project

1. Project 85-D-145, Fuel Production Facility
Savannah River Site, South Carolina

PROJECT TEC: $ 71,700 c/
START DATE: 3rd Qtr. FY 1985
COMPLETION DATE: 3rd Qtr. FY 1992

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1985	$ 5,800 a/	$ 5,800	$ 318
1986	18,000	18,000	13,824
1987	30,019	30,019	10,332
1988	21,100	21,100	2,966
1988 Reprogramming b/	(34,000)	(34,000)	0
1989	9,700 d/	9,700	18,684
1990	0	0	4,495
1991	8,481	8,481	8,360
1992	12,600	12,600	12,721

3. Narrative:

This project provides a new facility at the Savannah River Site (SRS) to produce a solid form of recyclable enriched uranium which has been recovered from reactor-irradiated fuel elements. The recovery process begins with a form of dilute liquid solution of uranyl nitrate (UN) which in the past was shipped to the Oak Ridge Y-12 Plant for processing into a reusable form. The new facilities provided by this project will convert the UN solution into uranium oxide, which will be packaged and shipped with significant improvement in safety and efficiency of transportation.

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a/ Includes $4,000,000 appropriated for project 85-D-142 and $1,800,000 for Project 85-D-145.
b/ Project funds reprogrammed to operating expense.
c/ Excludes $20,000,000 of operating expense funded work in FY 1990 which is integral to the project and is required for a complete and operable facility.
d/ Base table adjustment from operating expense.

IV. B. Plant Funded Construction Project (continued)

1. Project 85-D-145, Fuel Production Facility
Savannah River Site, South Carolina

3. Narrative (continued):

The current scope represents a significant change to the original scope of this project which included a new manufacturing facility to house the powder metallurgy process. Due to technological uncertainties and inadequate development of equipment performance data which caused lengthy delays and cost increases, this portion of the project's scope has been deleted. The revised scope focuses on the major safety objective of eliminating shipments of radioactive liquids.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 27,440	$ 18,684	$ 4,695	$ 8,360	$ 12,721
Capital Equipment	0	0	0	0	0
Operating Expenses	22,965	0	20,000	4,000	2,000

VOLUME 1

VERIFICATION AND CONTROL TECHNOLOGY

VOLUME 1

VERIFICATION AND CONTROL TECHNOLOGY

DEPARTMENT OF ENERGY

FY 1991 CONGRESSIONAL BUDGET REQUEST

ATOMIC ENERGY DEFENSE ACTIVITIES

VOLUME 1

VERIFICATION AND CONTROL TECHNOLOGY

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OVERVIEW

VERIFICATION AND CONTROL TECHNOLOGY

The mission of the Verification and Control Technology program is to develop and execute the United States (U.S.) national security and foreign policies in treaty verification, intelligence, and arms control in accordance with Executive Order 12333; Arms Control program of work defined in treaties, implementing agreements, pertinent National Security Directives; and in nuclear and other arms control negotiating procedures.

Verification and Control Technology activities are managed by the Office of Arms Control and the Deputy Assistant Secretary for Intelligence. Activities are carried out by the Department of Energy (DOE) Headquarters staff, national laboratories, and DOE contractors. Program efforts are coordinated with the Departments of State and Defense, including the Defense Advanced Research Projects Agency and the Defense Nuclear Agency; the Arms Control and Disarmament Agency; the Onsite Inspection Agency, the Central Intelligence Agency, and the Federal Bureau of Investigation.

Major Verification and Control Technology program objectives over the next five years include:

- Conducting advanced research, developing technologies, and fabricating systems for verifying treaties and technical intelligence collection;
- Providing technical and analytical support in nuclear and other arms control negotiations and related interagency deliberations;
- Supporting the Department's responsibilities to the Intelligence Community and the national security policy makers; and
- Assessing actual or potential threats to the Department's and other U.S. Government nuclear facilities and activities.

The Verification and Control Technology activities can be divided in three categories: Detection Technology, Analytical Support and Threat Assessment.

Detection Technology objectives in treaty verification are to locate, identify, and characterize nuclear detonations and to provide early warning of activities characteristic of nuclear proliferation. These nuclear detonations may occur underground, underwater, in the atmosphere, and in space. Detection technology activities include conducting research, and developing and fabricating systems for verifying arms control treaties. Related research and development activities also include detecting directed energy and chemical weapons and providing technical tagging and imagery support for treaty compliance verification. The long-term objective of the Detection Technology program is to ensure state-of-the-art verification technology consistent with national needs.

Analytical Support objectives include analyzing arms control activities to provide technical support to both the Department and national policy makers in the arms control process plus assessing Soviet research, development, testing and production of nuclear warheads and advanced weapons; Soviet strategic directed energy weapon technologies; and Soviet space nuclear power programs.

Threat Assessment objectives include assessing actual or potential threats to the Department and other U.S. Government nuclear facilities and activities.

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Verification and Control Technology near-term goals include:

- Developing effective tools for onsite and incountry verification of nuclear testing and other arms control treaties;
- Continuing development of next-generation satellite instrumentation for nuclear and other arms control treaty verification;
- Participating in arms control deliberations, emphasizing development of equipment and procedures to verify treaty compliance without compromising sensitive information at inspected DOE facilities;
- Analyzing foreign nuclear intelligence in support of the Administration's arms control proposals;
- Developing a departmental infrastructure to support domestic threat assessment activities throughout the Department's field complex including communications, designation and training of personnel, and implementation of domestic assessment guidelines as approved by the Department of Justice; and
- Enhancing the Department's ability to identify and assess threats from a larger threat spectrum than current capability allows.

Budget Summary

The FY 1991 Verification and Control Technology budget request includes a 5 percent increase over the FY 1990 Appropriation. The increase will provide the following:

- Increased analytical support for arms control;
- Expanded intelligence activities to more fully support the Department's requirements;
- Continuation of the construction of the Center for National Security and Arms Control at Sandia; and
- Commencement of construction activities for the Foreign Technology Assessment Center at the Lawrence Livermore National Laboratory.

Due to budgetary constraints, this budget request does not include funds to fabricate Deployable Seismic Verification System single element station units or the array and no funds are included for foreign deployments of CORTEX for onsite verification of the Threshold Test Ban and Peaceful Nuclear Explosions Treaties. In addition, development of detection technologies for treaty verification is slowed.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

LEAD TABLE

VERIFICATION AND CONTROL TECHNOLOGY

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
Operating Expenses						
Detection Technology	$110,800	$114,697	$114,697	$103,562	$-11,135	-10%
Analytical Support	27,890 a/	26,048	26,048	31,044	+4,996	+19%
Threat Assessment	2,655 b/	9,807	9,807	11,935	+2,128	+22%
Program Direction	5,505 c/ d/	4,711	4,711	4,943	+232	+5%
Subtotal, Operating Expenses	$146,850	$155,263	$155,263	$151,484	$ -3,779	-2%
Capital Equipment	7,786 e/	9,586	9,586	9,924	+338	+4%
Construction	0	985	985	12,592	+11,607	+1,178%
Total Program	$154,636	$165,834 f/	$165,834	$174,000	$ +8,166	+5%
Staffing (full-time equivalents)	74	68	68	68		

a/ Does not include transfer of $4,455,000 to Nuclear Safeguards and Security for Export Control and Technology Transfer. Reflects reprogramming of $200,000 to Security Investigations and reprogramming of $550,000 from Nuclear Safeguards and Security for Technology Transfer.

b/ Does not include transfer of $4,300,000 from Weapons Research and Development to the Office of Threat Assessment.

c/ Does not include transfer of $342,000 transferred to Weapons Program Direction for consolidation of Headquarters contractual support activities germane to all program offices.

d/ Does not include transfer of $810,000 (8 FTE's) to Nuclear Safeguards and Security for Export Control and Technology Transfer, $128,000 to the Office of Program Analysis and Financial Management, Weapons Program Direction, and $60,000 from the Deputy Assistant Secretary for Military Application, Weapons Program Direction to the Office of Threat Assessment.

e/ Does not include transfer of $1,300,000 in FY 1989 from Weapons Research and Development to the Office of Threat Assessment; reflects $314,000 reprogrammed to Nuclear Materials and Defense Waste activities; and an internal reprogramming of $300,000 to Analytical Support - Intelligence operating expenses.

f/ FY 1990 appropriation $169,878,000. Reflects sequestration of $2,548,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177), and transfer of $1,496,000 to the Office of Environmental Restoration and Waste Management.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

SUMMARY OF CHANGES

Verification and Control Technology

FY 1990 Appropriation	$165,834
Adjustments	0
FY 1991 Base	$165,834
Detection Technology	
· Inflation provided	+8,817
· Reduce verification efforts related to the following treaties Threshold Test Ban, Peaceful Nuclear Explosions, Chemical Warfare, Conventional Warfare, and Special Nuclear Material	-15,952
Analytical Support	
· Provide inflation	+1,094
· Increased effort for arms control treaty negotiations and related activities	+656
· Expanded intelligence activities	+3,246
Threat Assessment	
· Provide inflation	+412
· Expanded program	+1,716
Program Direction	
· Provide inflation	+198
· Increased support	+34
Capital Equipment	
· Provide inflation	+338
Construction	
· Continue construction activities for the Center for National Security and Arms Control	+9,015
· Commence construction activities for Foreign Technology Assessment Center	+2,992
FY 1991 Congressional Budget Request	$178,000

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

VERIFICATION AND CONTROL TECHNOLOGY

I. Preface: Detection Technology

Detection Technology objectives are to detect, identify, locate, and characterize nuclear detonations and advanced weapon developments underground, underwater, in the atmosphere, and in space. Related research and development activities also include detecting directed energy and chemical weapons and providing technical tagging and imagery support for treaty compliance verification. Activities include conducting advanced research and developing and fabricating systems for verifying current and potential nuclear, nonnuclear, and advanced weapon treaties.

The onsite monitoring activity is developing the capability of monitoring and verifying compliance with the proposed augmented Threshold Test Ban Treaty (TTBT) and the Peaceful Nuclear Explosions Treaty (PNET). The Department's role in this area is defined in National Security Decision Directives 51, 63, and 81. These National Security Decision Directives direct the verification community to make policy and implement technical actions to improve field-worthiness equipment modernization, human resources expertise, and capabilities to permit the U.S. to fulfill the TTBT/PNET verification responsibilities. The Department has developed and evaluated hydrodynamic yield measurements, Continuous Reflectometry for Radius versus Time Experiment (CORRTEX), as a primary verification technique. Experiments started in FY 1989, and continuing in FY 1990 and 1991 focusing on the reduction of errors in onsite yield determination. CORRTEX will be deployed with a complementary local seismic network and a trained cadre for related PNET onsite verification activities. The Detection Technology program developed the expertise, capability, and equipment for and managed the Joint Verification Experiments with the Soviets in August and September of 1988.

The satellite instrumentation program provides the national capability to monitor the atmosphere and space for nuclear detonations. DOE-produced satellite-borne sensors provide verification data in support of the Limited Test Ban Treaty as well as intelligence information on testing by proliferating nations and nuclear weapon states. The Department satellite flight systems provide continuous worldwide surveillance and treaty verification of clandestine nuclear testing in the atmosphere, near the earth, and in deep space. The Department's sensor systems constitute the Integrated Operational Nuclear Detonation Detection System currently deployed, principally on the Global Positioning System and Defense Support Program satellites. The Department maintains appropriate facilities, procedures, and documents to allow for proper design, procurement, integration, testing, and traceability. In addition, failure analysis and flight-quality repair of Department instrumentation is maintained on an as needed basis. The satellite instrumentation development and production capability is a unique national asset. The satellite instrumentation development and production capability is a unique national asset.

Seismic verification focuses on detecting, identifying, locating, and characterizing underground nuclear explosions, while emphasizing regional rather than teleseismic monitoring. The incountry seismic program supports research and development of regional and local seismic verification capabilities. This contributes to the Department's capability to provide equipment and systems to verify future nuclear testing treaties. The Norwegian Regional Seismic Array and the Deployable Seismic Verification System are examples of regional seismic systems. The seismic verification goal is in support of the policy toward improved seismic monitoring.

Sample and debris detection and analysis activities supplement other verification efforts and support measures for monitoring special nuclear material production. Detecting and identifying debris are instrumental in locating and characterizing nuclear-related activities. This activity constitutes the "smoking gun" of clandestine nuclear testing. This is an area of increasing concern in the current environment of third-world powers potentially developing nuclear capabilities. Activities in this area include improving current effluent monitoring and analysis capabilities, with the aim of improving selectivity and sensitivity.

The nonseismic monitoring program includes research and development of detection systems using technologies other than satellite or seismic means. Nonseismic detection methods are essentially nonexistent at this time. Other technical means of detecting nuclear tests require further investigation because of the vast area of the Soviet Union, with its large seismic regions, and the potential of "spoofing" scenarios.

Ground-based and space-based directed energy weapons are of increasing interest to the U.S. The U.S. has embarked on an intensive directed energy weapons development program; likewise, the Soviet Union is conducting research and development along similar lines. The Detection Technology program is conducting research on verification capabilities in the event of a directed energy treaty. These activities are a result of the need for information on experimental and/or operational systems employing strategic defense initiative type systems. The goal is to characterize all directed energy weapon systems. Sensors, systems, data handling, processing, and analysis capabilities will be developed.

The goal of Technology Development activities is to ensure that verification techniques are advanced by investigating advanced concepts, determining feasibility, and revisiting known scientific principles. Successful projects evolve from advanced concepts and are used in specific applications. The Radiation Detection Technology activities focus on the development of hardware and analytical tools that will meet the needs for locating, identifying, and characterizing nuclear source materials by their radiation signatures. The scope of Radiation Detection Technology includes exploratory research to uncover and advance new detection principles or concepts, as well as the development of special devices to be used in verification and also by the Intelligence Community. The Radiation Detection Technology element provided the radiation detection system to be used to implement verification provisions of the Intermediate-Range Nuclear Forces during FY 1989. The FY 1991 budget will continue to support development of radiation detection and other capabilities but at a reduced level.

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II. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Onsite Monitoring	$ 9,850	$ 14,510	$ 9,500	-35
Satellite Instrumentation	41,932	43,160	44,000	+2
Seismic Verification	17,375	10,963	9,900	-10
Sample/Debris Detection and Analysis	2,153	2,667	2,700	+1
Non-seismic Verification	3,500	4,115	4,200	+2
Directed Energy Verification	4,100	5,000	5,000	0
Technology Development	20,599	21,367	17,962	-16
Radiation Detection Technology	11,291	12,915	10,300	-20
Total, Detection Technology	$110,800	$114,697	$103,562	-10

II. B. Major Laboratory and Facility Funding

	FY 1989	FY 1990	FY 1991	% Change
Argonne National Laboratory	$ 1,849	$ 1,800	$ 1,670	-7
Brookhaven National Laboratory	424	360	330	-8
Idaho National Engineering Laboratory	2,581	2,400	2,230	-7
Lawrence Livermore National Laboratory	14,579	13,600	12,570	-8
Los Alamos National Laboratory	32,537	34,900	32,260	-8
Oak Ridge National Laboratory	1,301	960	890	-7
Pacific Northwest Laboratory	6,832	6,000	5,560	-7
Sandia National Laboratories	41,987	42,100	38,930	-8
Savannah River Laboratories	286	480	450	-6
Environmental Measurements Laboratory	314	100	110	+10

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III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
Onsite Monitoring	Conducted field tests and evaluations of upgraded onsite verification equipment; conducted experiments addressing yield estimation error uncertainty; and pursued efforts to estimate yields at lower levels.	Onsite monitoring activities will continue including equipment upgrades, yield estimation error activities, and efforts related to estimating yields at lower levels. Expanded support will provide for preparation of personnel and equipment to support verification of Threshold Test Ban Treaty and Peaceful Nuclear Explosions Treaty (TTBT/PNET).	Onsite monitoring activities will continue at a reduced level including equipment upgrades, yield estimation error activities, and efforts related to estimating yields at lower levels. Preparation of personnel and equipment support for verification of TTBT/PNET will continue at a reduced level.
	$ 9,850	$14,510	$ 9,500
Satellite Instrumentation	Completed development of the Very Large-Scale Integration microelectronics; developed technology for improved sensor and data processing systems.	Developmental activities will continue, including technology for improved sensor and data processing systems and advanced electronics packaging technology will commence.	Developmental activities will continue including technology for improved sensor and data processing systems and advanced packaging technology.
	Supported P46C(D-1) integration and testing, provided operational support to deployed and test systems; provided launch support for spacecraft carrying DOE payloads.	P46(D-2) payload will be delivered; operational support to deployed systems will continue; launch support for spacecraft carrying DOE payloads will continue.	Operational support to deployed systems will continue; launch support for spacecraft carrying DOE payloads will continue.
	Delivered coded aperture array for system integration; delivered the Uniformly Redundant Array (URA) Shuttle experiment; delivered five Global Positioning System/Nuclear Detonation System payloads, and one each Defense Support	Support will be provided to the URA and preliminary data reduction will commence. Six Global Positioning System/Nuclear Detonation System payloads, two Defense Support Program/	Two Global Positioning System/Nuclear Detonation System payloads will be delivered; two Defense Support Program/Advanced Radiation Detection I payloads will be delivered; one Defense Support Program/Advanced Radiation Detection II payload will be

Detection Technology

III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
	Program/Advanced Radiation Detection I and II payloads.	Advanced Radiation Detection I payloads, and two Defense Support Program/ Advanced Radiation Detection II payloads will be delivered.	delivered, and reports will be prepared on the URA.
	Produced radiation-hardened Large-Scale Integration microelectronics and integrated components for weight, space, and power reduction.	Production of Large-Scale Integration microelectronics activities will continue.	Selected production of radiation-hardened microelectronics will continue.
	Provided test and checkout for DOE payloads and training to the shuttle crews responsible for launching DOE payloads.	Payload test and checkout activities and training will continue.	Payload test and checkout activities and training will continue.
	$41,932	$43,160	$44,000
Seismic Verification	Conducted research in seismic array configuration, seismic propagation, data acquisition, processing, and analysis for both regional systems and incountry seismic stations; evaluated and improved yield estimation techniques; supported seismic signal processing program operations.	Activities will continue, including seismic research, yield estimation techniques, and signal processing program operations.	Activities will continue, including seismic research, yield estimation techniques, and signal processing program operations.
	Provided operational support to the Norwegian Regional Seismic Array/System Control and Receiving Stations.	Operational support to the Norwegian Regional Seismic Array/System Control and Receiving Station will continue.	Operational support to the Norwegian Regional Seismic Array/System Control and Receiving Station will continue.

Detection Technology

III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
	Continued the fabrication of the initial set of Deployable Seismic Verification System (DSVS) single element station units. Completed the design of the DSVS array station. Commenced integration of DSVS and initiated fabrication of second set of DSVS single element station units.	The initial set of DSVS single element station units will be delivered. Integration of the DSVS will continue. The fabrication of both the second set of DSVS single element station units and the DSVS array will be delayed.	Integration of the DSVS will continue. The fabrication of both the second set of DSVS single element station units and the DSVS array will be delayed.
	$ 17,375	$ 10,963	$ 9,900
Sample/Debris Detection and Analysis	Commenced project to improve tritium detection using accelerator mass spectrometry; developed Particle Inlet Mass Spectrometry technology.	Tritium detection improvement activities and the Particle Inlet Mass Spectrometry technology development activities will continue.	Tritium detection improvement activities and the Particle Inlet Mass Spectrometry technology development activities will continue.
	Developed Krypton Isotopic Laser Analysis methods; initiated development of advanced collector for Krypton and methane; initiated measurement of Krypton by photon burst mass spectrometry.	Krypton Isotopic Laser Analysis methods development will be completed; development of advanced collector for Krypton and methane will continue; and measurement of Krypton by photon burst mass spectrometry will continue.	Advanced collector development for Krypton and methane will be completed; measurement of Krypton by photon burst mass spectrometry will continue.
	Initiated search for organic and chemical signatures characteristic of nuclear proliferation.	Chemical signature activities will be completed and organic signature activities will continue.	Organic signature activities will be completed.
	Completed xenon measurement technology improvement.	Xenon measurement technology will be transferred to user.	No activity.
	No activity.	Improvements in methods for gaseous and particulate radionuclide sampling will be initiated.	Radionuclide sampling improvement activities will continue.
	$ 2,133	$ 2,467	$ 2,700

Detection Technology

III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
Non-Seismic Verification	Developed and applied advanced remote collection techniques to the resolution of arms control and treaty verification problems.	Advanced remote collection techniques activities will be expanded.	Advanced remote collection techniques activities will continue.
	Conducted infrasound research, development, testing, and evaluation to improve accuracy and sensitivity to low yield nuclear tests.	Infrasound R&D activities will continue.	Infrasound R&D activities will be completed.
	Commenced development of a regional ionospheric monitoring system, collecting and analyzing data from a wide variety of Nevada Test Site nuclear tests.	No activity.	No activity.
	$ 3,500	$ 4,115	$ 4,200
Directed Energy Verification	Completed prototype development for particle beam weapons detection; commenced subsystem development for the detection of High-Energy Lasers; and analyzed radionuclides for particle beam weapons.	Ground based particle beam detector development will be completed; conceptual design of particle beam detection for space application will be completed; developmental activities for the detection of High-Energy Lasers will continue; and activities will continue for radionuclide analyses.	Ground based particle beam detector will be fabricated; particle beam signatures will be measured and tested; development activities for the detection of High-Energy Lasers will continue; and activities will continue for radionuclide analyses.
	$ 4,100	$ 5,000	$ 5,000
Technology Development	Conducted advanced concepts research; expanded development of other tagging techniques such as electronic, bar code, holographic correlation, and chemical-optical geological for verification; initiated	Advanced concepts research will continue. Development of other tagging techniques will continue. Activity will be conducted on the program to support chemical and conventional warfare	Advanced concepts research will continue. Development of other tagging techniques will continue at a reduced level. Activity will be conducted at a reduced level on the program to support chemical and

Detection Technology

III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
	planning of program to support chemical and conventional warfare verification requirements.	verification requirements. Technology development for START verification and special nuclear material monitoring will be initiated.	conventional warfare verification requirements. Technology development for START verification and special nuclear material monitoring will continue at a reduced level.
	Developed actinide analysis technology; investigated feasibility for real-time detection of noble gases; conducted image processing integration development; commenced development of ambient temperature, high resolution gamma sensor; initiated expanded scope of chemical detection capabilities; initiated development of real-time tritium detection technology; conducted research on aerosol signatures; conducted remote geologic sensing development; developed Chemical Collection/Analysis Techniques.	Activities will be completed on the remote geologic sensing development; activities will be reduced on actinide analysis technology and chemical detection capabilities; activities will continue on image processing integration, gamma ray sensor, tritium detection technology, aerosol signatures, and Chemical Collection/Analysis Techniques; limited development of the detection of noble gases will commence.	Activities will be reduced on actinide analysis technology and chemical detection capabilities; activities will continue on image processing integration, gamma ray sensor, tritium detection technology, aerosol signatures, Chemical Collection/Analysis Techniques. Real-time noble gases proof-of-principle will be completed.
	Completed development of reflective particle tagging technology for START.	No activity.	No activity.
	$ 20,599	$ 21,367	$ 17,962
Radiation Detection Technology	Developed radiation detection technologies for arms control verification scenarios.	Radiation detection systems for arms control verification will be selected and developed.	Development of radiation detection systems for arms control verification will continue at a reduced level.
	No activity.	Development of verification technologies for special	Development of verification technologies for special

III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
		nuclear materials will be initiated.	nuclear materials will continue at a reduced level.
	Conducted Radiation Detection Program for foreign nuclear weapon detection and characterization; fielded radiation detection system for Intermediate-Range Nuclear Forces verification; initiated development of long-range radiation detection technology.	Activities will continue for the Radiation Detection Program for foreign nuclear weapon detection and characterization and development of long-range radiation detection technology; improvements in the radiation detection system for Intermediate-Range Nuclear Forces verification will be investigated.	Activities will continue for the Radiation Detection Program for foreign nuclear weapon detection and characterization and development of long-range radiation detection technology; improvements in the radiation detection system for Intermediate-Range Nuclear Forces verification will be investigated further.
	Developed Avalanche Photodiode Devices; built reduced-scale Gamma/Neutron Large Area Plastic Scintillator; supported field test and evaluation of High Efficiency Large Germanium Arrays.	Avalance Photodiode Devices development will continue; Gamma/Neutron Large Area Plastic Scintillator will be field tested; High Efficiency Large Germanium Arrays will have no activity.	Avalanche Photodiode Devices development will continue; and Gamma/Neutron Large Area Plastic Scintillator field test will continue.
	$ 11,291	$ 12,915	$ 10,300
Total, Detection Technology	$110,800	$114,697	$103,562

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

VERIFICATION AND CONTROL TECHNOLOGY

I. Preface: Analytical Support

The primary program area in this activity is analytical support. Responsibilities are fixed by statute, applicable rules, directives, Executive Orders, and international treaties or understandings. Analytical support consists of studies and analyses to support the implementation of the Administration's arms control policies communicated in National Security Decision Directives and treaty negotiation instructions. This program provides for direct technical and analytical support to interagency policy deliberations, U.S.-Soviet Nuclear and Space Talks negotiations, Intermediate Range Nuclear Force (INF) Treaty implementation, Nuclear Test Talks, the United Nations Conference on Disarmament and its Group of Scientific Experts, the Non-Proliferation Treaty Review Conference and Preparatory Committee meetings, the United Nations General Assembly Special Session on Disarmament, and internal DOE policy formulation. Objectives include providing continuing support to interagency/international policy deliberations and negotiations, analyzing Arms Control Treaty impacts on the DOE, providing Department programmatic support for improving arms control techniques and approaches, and maintaining capabilities of providing technical support in the arms control area.

Recent events have increased the Department responsibilities. The U.S. is involved in negotiations with the Soviets on improved verification of the Threshold Test Ban Treaty and Peaceful Nuclear Explosions Treaty leading to ratification. The Department is required to provide increased technical, analytical, and policy support for the negotiations. The Department has also increased its participation in the Strategic Arms Reduction Talks (START), INF Treaty implementation, and Defense and Space Talks. This was done given the likelihood of deep reductions in nuclear weapons, the possibility of modernization limits, and Soviet efforts to limit the U.S. Strategic Defense Initiative at the Geneva Nuclear and Space Talks. The link between reductions in weapons and additional limits on testing, the effect of reductions on the requirements for special nuclear materials and weapons production, related issues pertaining to weapon dismantlement, special nuclear material limits and disposition, and the effect of intrusive verification schemes on the Department's ability to protect national security information at its facilities are of particular interest.

Analytical Support also includes efforts in the intelligence arena in support of DOE and the Intelligence Community.

II. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Analytical Support	$ 27,890	$ 26,048	$ 31,044	+19

II. B. Major Laboratory and Facility Funding

	FY 1989	FY 1990	FY 1991	% Change
Argonne National Laboratory	$ 427	$ 540	$ 660	+19
Los Alamos National Laboratory	4,349	4,664	5,745	+23
Lawrence Livermore National Laboratory	9,180	10,238	12,635	+23
Sandia National Laboratories	1,952	2,020	3,095	+53
Oak Ridge National Laboratory	2,650	3,030	3,640	+20
Pacific Northwest Laboratory	923	700	884	+26
Savannah River Laboratory	777	1,075	1,349	+25

III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
Analytical Support	Participated in interagency development of policy options, treaty provisions, verification protocols, onsite challenge inspection procedures, delegation negotiating instructions, and compliance determination deliberations for arms control treaty regimes.	Participation will continue in interagency development of policy options, treaty provisions, verification protocols, onsite challenge inspection procedures, delegation negotiating instructions, and compliance determination deliberations for arms control treaty regimes.	Participation will continue in interagency development of policy options, treaty provisions, verification protocols, onsite challenge inspection procedures, delegation negotiating instructions, and compliance determination deliberations for arms control treaty regimes. Participation in and technical support for nuclear testing and other arms control treaty negotiating delegations will be expanded as appropriate.
	Evaluated onsite/suspect-site inspection proposals associated with verification of each treaty under consideration. Developed procedures to confirm compliance without giving access to sensitive information.	Evaluation of onsite/suspect-site inspection proposals associated with verification of each treaty under consideration will continue. Development of procedures to confirm compliance without giving access to sensitive information will continue.	Evaluation of onsite/suspect-site inspection proposals associated with verification of each treaty under consideration will continue. Development of procedures to confirm compliance without giving access to sensitive information will continue.

Analytical Support

III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
	No activity.	No activity.	Planning and conduct of directed exercises at DOE sensitive facilities for contingency use in accelerated planning and preparation of Onsite Inspection Readiness Plans for implementation will be supported should such inspections appear imminent at sensitive facilities within the DOE complex. Consequences of treaty imposed short-notice suspect site inspections at sensitive DOE facilities will be investigated. Series of limited "red/blue team" directed exercises will be conducted at DOE sensitive facilities to evaluate inspection disclosure risks associated with particularly sensitive activities within the DOE nuclear weapon and high energy physics research complex.
	Examined policy options, procedures, production program and logistical implications, and mechanics of alternative weapons dismantlement and special nuclear material disposition schemes in an arms control context.	Policy options, procedures, production program and logistical implications, and mechanics of alternative weapons dismantlement and special nuclear material disposition schemes in an arms control context will continue to be examined.	Policy options, procedures, production program and logistical implications, and mechanics of alternative weapons dismantlement and special nuclear material disposition schemes in an arms control context will continue to be examined. Studies of verified dismantlement/ disposition approaches and methods at existing sensitive and alternative nonsensitive facilities will be completed. Methods, locations, and

Program Activity	FY 1989	FY 1990	FY 1991
			facilities for nuclear weapon dismantlement and safeguarded storage, conversion (to non-military use), or destruction of derived nuclear materials will be surveyed. Public policy, regulatory, and environmental/health/safety considerations will be incorporated.
	Maintained data base of DOE/Department of Defense (DOD) arms control research. Made research results available in bibliographic form to cleared experts in other departments, agencies, research laboratories, and supporting services contractor firms. Contributed to annual Arms Control and Disarmament Agency (ACDA) research report to Congress.	Data base of DOE/DOD arms control research will be maintained. Research results will be made available in bibliographic form to cleared experts in other departments, agencies, research laboratories, and supporting services contractor firms. Contributions to annual ACDA research report to Congress will continue. Possible use of optical disk medium as alternative for on-line subscribers will be explored.	Data base of DOE/DOD arms control research will be maintained. Research results will be made available in bibliographic form to cleared experts in other departments, agencies, research laboratories, and supporting services contractor firms. Contributions to annual ACDA research report to Congress will continue. Availability of optical disk data base to selected cleared subscribers will be expanded.
	Analyzed with DOE models the impact of arms control proposals in terms of strategic stability based on alternative U.S. and Soviet offensive and defensive force postures and war plan execution options.	The impact of arms control proposals in terms of strategic stability based on alternative U.S. and Soviet offensive and defensive force postures and war plan execution options will continue to be analyzed with DOE models. Alternative U.S. and Soviet offensive and defensive force postures and war plan execution options will be modeled. Computer exchange analyses of strategic modernization options will be refined.	The impact of arms control proposals in terms of strategic stability based on alternative U.S. and Soviet offensive and defensive force postures and war plan execution options will continue to be analyzed with DOE models. Computer exchange analyses of strategic modernization options will be refined and use of exchange models to other than strategic analytical tasks will be expanded.

Analytical Support

III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
	Maintained export control and technology commercialization activities.	Activity transferred to Nuclear Safeguards and Security.	No activity.
	Expanded level of technical and analytical support services to Headquarters, particularly to support the Administration's arms control and nonproliferation initiatives.	Level of technical and analytical support services to Headquarters will be maintained.	Level of technical and analytical support services to Headquarters will be maintained.
	Maintained the transfer of technologies, incentives, and related activities of possible supplier nations and worldwide movement and use of special nuclear materials.	Continue base program.	Continue base program with focus on additional possible supplier nations.
	Provided assessments of foreign basic science and technology applications.	Continue base program.	Continue base program.
	Provided current intelligence information on the prospects for major disruptions in energy supplies.	Continue base program.	Continue base program.
	Provided supporting analyses for treaty negotiations, monitoring, and verification of special concern on threat to U.S., its nuclear weapons, and the complex from foreign nuclear and nuclear associated weapons capabilities.	Continue base program with increased focus on monitoring and verification activities.	Continue FY 1990 base program with increased focus on monitoring and verification activities.
	Provided analysis and assessment on the nuclear capabilities of potentially proliferant countries.	Continue base program.	Continue base program with focus on additional potentially proliferant countries.
Total, Analytical Support	$27,890	$26,048	$31,044

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

VERIFICATION AND CONTROL TECHNOLOGY

I. Preface: Threat Assessment

Threat Assessment program provides assessments of actual or potential adversaries and adversarial actions that could impact the Department's facilities and activities (programmatic threat assessment) and supports the total U.S. Government by providing expert technical capability to evaluate threats involving nuclear material and/or facilities (communicated threat credibility assessment). Tasks include: coordinating information requirements with appropriate Federal, state, and local government agencies and organizations; developing and maintaining data bases in support of threat assessment activities; and management of the Special Technologies program.

Additional funding is required to create a Threat Assessment program better suited to support assessments of specific threats to the Department's facilities. The program is currently limited in scope and does not offer local/regional threat assessments for impact on DOE facilities.

II. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Threat Assessment	$ 2,655	$ 9,807	$11,935	+22

II. B. Major Laboratory and Facility Funding

	FY 1989	FY 1990	FY 1991	% Change
Idaho National Engineering Laboratory...	$ 0	$ 1,000	$ 1,050	+5
Lawrence Livermore National Laboratory .	0	4,800	5,040	+5
Nevada Operations Office	1,219	1,000	1,050	+5

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Threat Assessment

III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
Threat Assessment	Assessed terrorism and anti-nuclear extremism. Provided training to intelligence organizations.	Terrorism and anti-nuclear extremism will continue to be assessed. Training to intelligence organizations will be provided.	Program will be strengthened to provide more comprehensive coverage of all threats to the Department, including a regional threat program.
	Provided basic capability to assess nuclear threats.	The basic capability to assess nuclear threats will be continued.	Program will be conducted to provide more comprehensive communicated threat credibility assessments by enhancing the field network.
	No activity.	Conduct espionage threat awareness training program and activities.	Continue FY 1990 efforts.
Total, Threat Assessment	$ 2,655	$ 9,807	$11,935

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KEY ACTIVITY SUMMARY

VERIFICATION AND CONTROL TECHNOLOGY

I. Preface: Program Direction

Program Direction provides salaries, benefits, and travel for Headquarters personnel in the Office of Arms Control and the Office of the Deputy Assistant Secretary for Intelligence. These employees are responsible for managing the Verification and Control Technology field activities and executing Headquarters staff functions. Duties include: managing research and development of treaty verification systems; participating in interagency groups on arms control; supporting arms negotiations; providing Secretarial Officers with intelligence information relating to their programmatic responsibilities; operating the centralized domestic threat capability for the Department; and participating in committees on matters relating to foreign nuclear weapons and foreign nuclear energy programs, capabilities, and resources.

II. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Personnel Compensation	$ 4,481	$ 3,875	$ 3,995	+3
Personnel Benefits	502	408	420	+3
Travel	522	428	528	+23
Program Direction	$ 5,505	$ 4,711	$ 4,943	+5

III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
Program Direction	Supports 74 FTE's at Headquarters.	Supports 68 FTE's at Headquarters.	Supports 68 FTE's at Headquarters.

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KEY ACTIVITY SUMMARY

VERIFICATION AND CONTROL TECHNOLOGY

I. Preface: Capital Equipment

The Verification and Control Technology program requires capital equipment at the national laboratories to conduct the verification/detection technology research and development activities and to implement intelligence-related analytical activities. As verification requirements increase in scale and sensitivity, research, development, and production of verification systems requires increasingly sophisticated and technically complex design and testing equipment. These needs are reflected in this request for capital equipment. Capital equipment funds are used to upgrade existing laboratory equipment, and procure and enhance computer software/hardware systems, update and modernize accessories to existing laboratory equipment, and support the development and production of in-country treaty verification. Much of the equipment required consists of small-scale bench test devices such as oscilloscopes and electronic calibration equipment, support devices such as a spectrum analyzer and high-quality charge couple devices for directed energy weapons detection research, and multichannel analyzers and several wide-band oscilloscopes for satellite instrumentation development. Larger-scale equipment, however, also must be enhanced, replaced, or procured. Such examples include general purpose computers, computer-aided engineering and design workstations, and thermal-vacuum chamber upgrade equipment. Such capital equipment is essential if the DOE laboratories are to maintain a sound basis for technology development and support the Department's treaty verification and intelligence support commitments.

II. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Capital Equipment	$ 7,786	$ 9,586	$ 9,924	+4

II. B. Major Laboratory and Facility Funding

	FY 1989	FY 1990	FY 1991	% Change
Argonne National Laboratory	$ 125	$ 200	$ 300	+50
Brookhaven National Laboratory	4	75	150	+100
Idaho National Engineering Laboratory ..	203	333	466	+40
Lawrence Berkeley National Laboratory ..	72	0	0	0
Lawrence Livermore National Laboratory .	1,898	2,150	2,190	+2
Los Alamos National Laboratory	1,894	1,750	1,800	+3
Oak Ridge National Laboratory	188	200	250	+25
Pacific Northwest Laboratory	434	850	900	+6
Sandia National Laboratories	1,907	2,050	2,100	+2
Savannah River Laboratory	64	350	350	0
Nevada Operations Office	350	1,000	1,000	0

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III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
Capital Equipment	Provided equipment funding to meet systems fabrication, technology research and development, and analytical capabilities.	Equipment funding will be provided to meet systems fabrication, technology research and development, and analytical capabilities.	Equipment funding will be provided to meet systems fabrication, technology research and development, and analytical capabilities.
Total, Capital Equipment	$ 7,786	$ 9,586	$ 9,924

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KEY ACTIVITY SUMMARY

VERIFICATION AND CONTROL TECHNOLOGY

I. Preface: Construction

Funding is requested for one new construction project: the Foreign Technology Assessment Center dedicated to the Intelligence Program. In addition, second year funding is requested for the FY 1990 project - Center for National Security and Arms Control.

II. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Construction	$ 0	$ 985	$ 12,592	+1,178

III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
Project 91-D-192, Foreign Technology Assessment Center, LLNL	No activity.	No activity.	Perform Title I and II.
	$ 0	$ 0	$ 2,592
Project 90-D-186 Center for National Security and Arms Control, SNL	No activity.	Perform Title I and II.	Initiate construction.
	$ 0	$ 985	$10,000
Total, Construction	$ 0	$ 985	$12,592

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KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Verification and Control Technology

IV. A. Construction Project Summary

Project No.	Project Title	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Unappropriated Balance	TEC
91-D-192	Foreign Technology Assessment Center, LLNL	---	---	2,592	17,408	20,000
90-D-186	Center for National Security and Arms Control, SNL	$ ---	$ 985	$ 10,000	$ 24,600	$ 35,585
Total, VECT Construction		$ ---	$ 985	$ 12,592	$ 42,008	$ 55,585

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KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Verification and Control Technology

IV. B. Plant Funded Construction Projects

1. Project title and location: 91-D-192, Foreign Technology Assessment Center
Lawrence Livermore National Laboratory, Livermore, California

Project TEC: $20,300
Start Date: 2nd Qtr. FY 1992
Completion Date: 4th Qtr. FY 1993

2. Financial schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 2,592	$ 2,592	$ 2,400
1992	11,608	11,608	5,700
1993	5,800	5,800	11,900

3. Narrative:

This project will consist of a high-security vault, qualified to house work involving Sensitive Compartmented Information. Approximately 18,600 net square feet will provide office space for 141 personnel; approximately 6,000 net square feet of heavy and light laboratory space will be included; approximately 3,200 net square feet is required for support programs; approximately 5,100 net square feet will be utilized for a 120 seat briefing and conference facility and other small conference rooms.

The purpose of this project is to provide extensive compartmented workspace to make the technological capabilities and knowledge of the Lawrence Livermore National Laboratory available to the U.S. Intelligence Community. Also, the laboratory's Emergency Preparedness and Response functions will be coordinated from this facility.

DOE's nuclear weapons laboratories have a unique capability for vital contributions to the national intelligence effort in two strongly related but distinct areas: first, for understanding foreign nuclear weapons-related activities, there are no other fully expert U.S. sources of analysis and assessment. Second, in support of the U.S. nuclear weapons program and other major research programs, the laboratories have built up an exceptional competence in a wide range of fields such as electronics, chemistry, computational physics, and many branches of engineering.

4. Total Project Funding (BO):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 2,400	$ 5,700	$ 11,900
Capital Equipment	0	0	0	0	0
Operating Expenses	0	150	0	0	0

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FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
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KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Verification and Control Technology

IV. B. Plant Funded Construction Projects

1. Project title and location: 90-D-186, Center for National Security and Arms Control
Sandia National Laboratories, Albuquerque, New Mexico

Project TEC: $35,585
Start Date: 1st Qtr. FY 1991
Completion Date: 2nd Qtr. FY 1994

2. Financial schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 985	$ 985	$ 900
1991	10,000	10,000	7,000
1992	19,600	19,600	19,000
1993	5,000	5,000	5,700
1994	0	0	2,985

3. Narrative:

This project will provide for a light laboratory, offices, and conference facility. This facility will be four stories and a full basement with a conference center (153,000 square feet gross, 86,000 square feet net, made up of 34,000 square feet of office, 45,000 square feet of laboratory space and 7,000 square feet of conference space) and will be a site adaptation of a previously built laboratory. The building will have a modular design to facilitate varying the size of laboratory and office spaces in minimum time and at low cost as requirements change.

The purpose of this project is to serve as a focus for related technical activities in national security and Arms Control. This will be achieved by combining scattered groups into a special compartmented area where there is special access computing facilities available and where a single special compartmented information library vault is available.

4. Total Project Funding ($K):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 900	$ 7,000	$ 27,685
Capital Equipment	0	0	0	0	0
Operating Expenses	20	0	0	0	0

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NUCLEAR SAFEGUARDS AND SECURITY

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OVERVIEW

NUCLEAR SAFEGUARDS AND SECURITY

The major mission of the Nuclear Safeguards and Security program is to develop measures to assure effective protection of the Department of Energy's (DOE) nuclear weapons, nuclear materials, and facilities against theft, sabotage, espionage, and terrorist activity. The mission also includes providing technical support to international activities designed to minimize the proliferation of nuclear weapons, identifying classified and unclassified sensitive information critical to the national security, controlling nuclear energy-related exports, and promoting the transfer of nonsensitive Defense Programs (DP) funded technology to the private sector in accordance with appropriate statutory requirements and the DOE regulations.

Major objectives for safeguards and security over the next five years include the following areas:

1. Balance the Nuclear Safeguards and Security program between physical security measures and programs designed and operated to protect against both external and internal threats with increased emphasis on the insider threat.

2. Implement classified document/material control improvements.

3. Continue emphasis on technology upgrades in the material control and accounting area.

4. Increase emphasis on needed computer security enhancement activities.

5. Preserve the essential technology base for domestic and international safeguards and security.

6. Strengthen the personnel security/clearance program.

7. Develop and implement improved policy and guidance for the identification of classified and unclassified sensitive information and for the control of nuclear related exports for the Department.

The FY 1991 budget continues a shift in emphasis from large-scale hardening and protection against outsider adversary intrusion to a more balanced program that strengthens protection against insider threats.

Continuing Nuclear Safeguards and Security program emphasis includes: (1) reducing the direct field funding for safeguards and security projects and operating costs; (2) an increased emphasis on a user-need based approach for technology development applicable to multiple facilities to reduce overall risks and help control implementation costs; (3) increased oversight of field operations through Master Safeguards and Security Agreements and performance requirements in supporting the DOE Orders; (4) a strengthened personnel security program for the Department that includes a streamlined and improved clearance process; (5) a personnel security assurance program for employees working in critical positions; (6) a coherent security awareness and protection plan against unauthorized actions within the defense complex; and (7) categorizing sensitive uncontrolled DOE developed technology subject to export controls.

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LEAD TABLE

NUCLEAR SAFEGUARDS AND SECURITY

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
Safeguards and Security Operational Support	$30,543 a/ b/	$32,299	$32,299	$34,962	$ +2,663	+8%
Technology and Systems Development	27,396	25,804	25,804	26,114	+310	+1%
International	5,350	5,155	5,155	5,104	-51	-1%
Classification and Technology Policy	2,525 c/ d/	7,901	7,901	8,061	+160	+2%
Program Direction	8,636 e/ b/	9,332	9,332	9,693	+361	+4%
Capital Equipment	4,620 f/	4,892	4,892	5,066	+174	+4%
Construction	0	0	0	2,000	+2,000	+100%
Total	$79,070	$85,383	$85,383	$91,000	$ +5,617	+7%
Operating Expenses	$74,450	$80,491	80,491	83,934	+3,443	+4%
Capital Equipment	4,620	4,892	4,892	5,066	+224	+4%
Construction	0	0	0	2,000	+2,000	+100%
Total	$79,070	$85,383 g/	$85,383 g/	$91,000	$ +5,617	+7%
Staffing (FTE's)						
Headquarters	139	141	141	141		
Chicago Operations Office	49	72 h/	72 h/	72 h/		
Total Staffing (FTE's)	188	213	213	213		

a/ Excludes comparability transfer of $271,000 in FY 1989 to Weapons Program Direction for consolidation of Headquarters contractual support activities germane to all program offices. Reflects reprogramming of $500,000 for export control activities.
b/ Reflects reprogramming of $400,000 for Security Investigations.
c/ Excludes comparability transfer in FY 1989 of $4,455,000 from Verification and Control for Export Control and Technology Transfer. Reflects reprogramming of $50,000 for export control activities.
d/ Excludes comparability transfer of $176,000 in FY 1989 to Weapons Program Direction for consolidation of Headquarters contractual support activities germane to all program offices.
e/ Excludes comparability transfer of $810,000 in FY 1989 for 8 full-time equivalents associated with Export Control and Technology Transfer; excludes comparability transfer of $505,000 in FY 1989 for 11 full-time equivalents transferred to the Deputy Assistant Secretary for Planning and Resource Management; excludes comparability transfer of $29,000 in FY 1989 for 1 full-time equivalent from the Deputy Assistant Secretary for Military Application.
f/ Reflects reprogramming of $180,000 for Nuclear Materials and Defense Waste activities.
g/ FY 1990 Appropriation of $87,208,000 adjusted for the following; reflects sequestration of $1,234,000 for operating and $75,000 for capital equipment to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177); Also reflects transfer of $516,000 to the Office of Environmental Restoration and Waste Management.
h/ Reflects transfer of 23 FTE's at Chicago Operations Office from Management and Administration.

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SUMMARY OF CHANGES

Nuclear Safeguards and Security

FY 1990 Appropriation	$ 85,383
Adjustments	0
FY 1991 Base	$ 85,383
Safeguards and Security	
· Provides for Nuclear Safeguards and Security escalation	+3,582
· Increased maintenance of Central Training Academy	+1,995
· Reduced effort in Technology and Systems Development and International activities	-1,880
Construction	
· Provides GPP funding for facility upgrades at Central Training Academy	+2,000
FY 1991 Congressional Budget Request	$ 91,000

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KEY ACTIVITY SUMMARY

NUCLEAR SAFEGUARDS AND SECURITY

I. Preface: Safeguards and Security Operational Support

New Brunswick Laboratory is the Center of Excellence in nuclear materials measurement reference base and serves as a technical extension of the Office of Safeguards and Security in areas of measurement science and material accounting. The Nuclear Materials Management and Safeguards System is the national data base and information support system for nuclear materials under the safeguards controls and special accounting procedures of the United States Government. The Nuclear Materials Management and Safeguards System is the primary mechanism used by the Government to fulfill its commitments to track nuclear materials for purposes of safeguards, production, and materials management, financial and cost accounting, and reporting under international treaties and agreements. Security operational support provides for the overall improvement of safeguards and security activities. This support ensures that the Computer Security, Security Education and Awareness, Operational Security, Personnel Security Assurance Program, the alien contacts data base, and the Central Training Academy are effective. Additionally, this support also provides for effective Headquarters operations (e.g., guard force, safeguards and security support services).

II. A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
New Brunswick Laboratory (NBL)	$ 3,615	$ 4,010	$ 4,026	0
Nuclear Materials Management and Safeguards System (NMMSS)	3,100	3,296	3,100	- 6
Central Training Academy (CTA)	6,246	6,700	8,975	+ 34
Technical Security Countermeasures (TSCM)	1,269	1,464	1,384	- 5
Security Education and Awareness	181	0	0	0
Headquarters Guard Contract	5,500	5,725	5,848	+ 2
Personnel Security Assurance Program (PSAP)	600	614	616	0
Personnel Security Research and Analysis	100	250	187	- 25
Central Personnel Clearance Index	400	50	75	+ 50
Additional Support	9,532	10,190	10,751	+ 6
Total, Safeguards and Security Operational Support	$ 30,543	$ 32,299	$ 34,962	+ 8

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II. B. Major Laboratory and Facility Funding

	FY 1989	FY 1990	FY 1991	% Change
New Brunswick Laboratory	$ 3,615	$ 4,010	$ 4,026	0
Martin Marietta	$ 3,100	$ 3,496	$ 3,300	- 6
Central Training Academy	$ 6,246	$ 6,700	$ 8,975	+ 34
Richland Operations	$ 1,354	$ 1,202	$ 1,227	+ 2

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Safeguards and Security Operational Support			
New Brunswick Laboratory (NBL)	Conducted measurement sciences and nuclear material accountability assessments and followup reviews of DOE facilities.	Continue at FY 1989 level of effort.	Conducts material-related safeguards assessments and followup reviews.
	Improved, fabricated, and provided certified chemical and isotopic reference materials for national and international use.	Continue at FY 1989 level of effort.	Develops, certifies, and distributes reference materials for national and international use.
	Transferred developed measurement technology to the safeguards community.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort.
	Conducted ongoing programs addressing NBL operations such as safeguards and health and safety to meet fixed DOE requirements.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort.
	$ 3,615	$ 4,010	$ 4,026
Nuclear Materials Management and Safeguards System (NMMSS)	Operated, maintained, and modernized the national nuclear materials data base and information system to provide timely, accurate, and comprehensive safeguards and materials management data.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort.

III. Safeguards and Security Operational Support (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Nuclear Materials Management and Safeguards System (NMMSS) (Cont'd)	Examples are:	Examples are:	Examples are:
	Completed three training sessions for NMMSS users.	Maintain FY 1989 level of effort. Initiate training on improvements implemented to help ensure national protection of Special Nuclear Materials.	Maintains FY 1990 level of effort and continues training initiated in FY 1990.
	Provided technical assistance to working groups with the International Atomic Energy Agency.	Continue FY 1989 level of effort and assist in the resolution of any discrepancies identified by the Agency.	Maintains FY 1990 level of effort.
	Updated NMMSS long-range plan.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort.
	Continued upgrading reference file maintenance system.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort.
	Maintained and enhanced Automated Nuclear Transfer System.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort.
	Developed personal computer applications.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort.
	Produced and distributed report products to NMMSS users, including providing data in response to ad hoc requests.	Process approximately 700 NMMSS ad hoc requests for information from DOE Headquarters, field offices, and other Government agencies.	Maintains FY 1990 level of effort.
	Planned and coordinated NMMSS Users Meeting.	Plan and coordinate NMMSS Users Meeting.	Plan and coordinate NMMSS Users Meeting.
	$ 3,100	$ 3,296	$ 3,100
Central Training Academy (CTA)	The CTA provided training for approximately 5,400 students onsite and offsite. Six new courses were offered to students during the year, bringing the total to 40 courses. Also upgraded and replaced selected low-value capital equipment items.	Provide training for approximately 5,000 students and provide four new courses. Also will commence facility maintenance work not previously paid for by CTA.	Will provide training for approximately 5,000 students. Several new courses will be conducted. Increased funding over FY 1990 will be used for maintenance of existing facilities which are substandard.

III. Safeguards and Security Operational Support (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Central Training Academy (CTA) (Cont'd)	$ 6,246	$ 6,700	$ 8,975
Technical Security Countermeasures (TSCM)	Provided support to sensitive facilities and operations. Enhanced training capability for other DOE TSCM support organizations.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort.
	Provided basic, refresher, and advanced training to the DOE contractor technicians.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort.
	Established a phased program to upgrade and maintain Countermeasures program at a high level of proficiency and competency.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort.
	Provided long-range strategic planning for the overall Countermeasures program, which included technology development needs.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort.
	$ 1,269	$ 1,464	$ 1,384
Security Education and Awareness	Updated DOE Order 5631.1A based on field input, security surveys, Inspection and Evaluation reports, and other data sources. Reviewed, updated, and/or created security briefing materials.	No activity performed in this area.	No activity.
	$ 181	$ 0	$ 0

III. Safeguards and Security Operational Support (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Headquarters Guard Contract	Provided security for the protection of Government property, classified matter, and personnel at the Forrestal and Germantown buildings. Protective force personnel were at fixed and mobile ports and operated specialized equipment. They maintained physical fitness and received training to ensure effective and efficient response to situations.	Continue at FY 1989 level of effort.	Maintain FY 1990 level of effort.
	$ 5,500	$ 5,725	$ 5,848
Personnel Security Assurance Program (PSAP)	Developed and executed training activities for both Federal and contractor workforces, including executive management, line supervision, medical, and security elements. Assisted field offices in implementing the program, delivered and set up training materials, and carried out contractor training activities. Developed and tested quality assurance methodology and assisted field in review and recommendation for improving and enhancing contractor activities. Initiated research and analysis activities to ensure that the most cost-effective methods were used.	Complete the initial field implementation. Monitor ongoing training and other activities, and redesign and distribute upgraded materials. Initiate an evaluation/validation effort to assure the quality and effectiveness of the training program. Conduct reviews of field office and contractor program efforts, review field office surveys and contractor audits. Review similar outside agency and industry activities for components with a potential for effective application to PSAP.	Continues management oversight of the PSAP. Utilizes the data obtained from the evaluation and validation effort to assure the effectiveness of the training program. Reviews and updates the training program and training materials, and assists in modification of the training effort. Finalizes inspection criteria with the Office of Security Evaluations and the field. Continues program review and support for survey and audit efforts, and implements approved improvements and enhancements. Limits expansion of the PSAP position definitions and the PSAP components.
	$ 600	$ 614	$ 616

III. Safeguards and Security Operational Support (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Personnel Security Research and Analysis	Conducted research and analysis activities to investigate and validate techniques and methods for improving and/or enhancing personnel security programs. Continued efforts including cataloging and analyzing program generated needs identified in FY 1988 and conducted a workshop to prioritize research and analysis activities to meet those needs.	Expand research and analysis activities in support of the DOE personnel security programs. Continue those activities initiated in earlier years, including recommendations for tasks to meet PSAP generated needs.	Continues research and analysis activities. Establishes pilot programs to test recommended improvements and enhancements in an operational environment. Implements research and analysis tasks to meet specific program needs. Undertakes a minimal effort to normalize a psychological test on selected departmental elements in sensitive positions.
	$ 100	$ 250	$ 187
Central Personnel Clearance Index	Performed tasks related to the solution of problems associated with the input of data to the Central Personnel Clearance Index, such as preparation of Security Automated Communications Network transmission; reviewed and analyzed specified data fields; and conducted system analyses for the purpose of improving Central Personnel Clearance Index data entry timeliness and the accuracy of the data.	Perform critical tasks related to the solution of problems associated with the input of data to the Central Personnel Clearance Index.	Maintains support tasks to complete full integration of the DOE Integrated Security Systems. This system effects realtime interactions among Central Personnel Clearance Index, classified visits and badge tracking systems for cross-check data.
	$ 400	$ 50	$ 75
Additional Support	The Vulnerability Assessment Program provided enhanced software tools needed by the DOE to assess the adequacy of integrated Safeguards and Security at its facilities. These computer programs are widely used to determine present performance of Safeguards and Security systems against a spectrum of threats. Enhanced developments in the systems design include all-inclusive integration of existing software packages.	Continue to provide the software codes needed by the DOE to assess the adequacy of facility Safeguards and Security against defined threats. The Vulnerability Assessment program will continue to make program changes and enhancements. Training support will continue at the CTA for instruction of computerized vulnerability assessments and development of Master Safeguards and Security Agreements.	Continues FY 1990 level of effort in evaluating protection systems against insider and outsider threats. Support will include continued code upgrades and limited instruction at the CTA.

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III. Safeguards and Security Operational Support (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Additional Support (Cont'd)	Managed and oversaw the approval process for Master Safeguards and Security Agreements. Increased support to the validation of approved Master Safeguards and Security Agreements internally and with the Office of Security Evaluations. Continued refinement of training methods and models for Security Agreements development and required vulnerability assessment systems.	Continue to manage and oversee the approval process of all submitted Master Safeguards and Security Agreements and annual reviews. Coordinate the verification of all document data with cognizant program and operations offices. Certify the security requirements of planned upgrades. Provide validation of approved Master Safeguards and Security agreements and vulnerability assessments. Provide for the phase-in of a changeover to the Site Safeguards and Security Plan document format.	Maintains FY 1990 level of effort.
	Continued support in the personnel security area for required administrative review and Headquarters operations. Provided for increased technical services and assistance support for Headquarters. Continued the project providing specialized technical and support assistance to the Office of Safeguards and Security. Also provided additional technical support for the expansion of Headquarters security responsibilities.	Continue at FY 1989 level of effort.	Provides contractual support for technical and administrative assistance to the Office of Safeguards and Security. Limited support for additional contractual support commitments.
	Provided support in publication of the DOE policy, procedures, and guidelines. Developed presentation materials, speeches, communications, and graphics for computer security awareness and training. Assisted in the review of security plans for approval and accreditation. Assisted in the development of planned statement of threat, and other documents to provide guidance on the direction of the computer security programs.	Same as FY 1989 level of effort. In addition, will accredit/reaccredit classified computer systems operating at a specified protection level. Annually monitor these systems to ensure compliance with Automated Data Processing security plan.	Maintains FY 1990 level of effort.

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III. Safeguards and Security Operational Support (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Additional Support (Cont'd)	The Phase III Headquarters enhancement project was completed. However, funding will be necessary to ensure engineering and consulting service as well as maintenance to ensure system expansion and other modifications that may have to be made from time-to-time to accommodate ever-changing DOE requirements.	Provides for engineering support effort to direct the installation of the security alarm control system. Technical direction will also be provided to ensure that specifications of the security alarm control system is met.	Maintains FY 1990 level of effort.
	No activity.	Reflects transfer of 23 FTE's at Chicago Operations Office in the Safeguards and Security Division from Management and Administration.	Maintains FY 1990 level of effort.
	$ 9,532	$ 10,190	$ 10,751
Safeguards and Security Operational Support	$ 30,543	$ 32,299	$ 34,962

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR SAFEGUARDS AND SECURITY

I. Preface: Technology and Systems Development

Includes activities to develop state-of-the art technology related to safeguarding the DOE facilities, materials and information through development and evaluation of new components and systems for physical security, detection, surveillance and control; nuclear materials measurements and accounting, quality assurance programs and measurement standardization; and effectiveness evaluations, generic systems design, and integration of Materials Control and Accounting with physical protection. Includes research and development in support of international safeguards and the International Atomic Energy Agency in fulfillment of the U.S. nonproliferation policy and objectives.

II. A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Science and Technology Base Development	$ 12,328	$ 10,043	$ 10,380	+ 3
Computer Security	3,250	3,757	3,811	+ 1
Basic Systems Design, Integration and Evaluation	6,430	6,332	6,486	+ 2
Onsite Test and Evaluation and Facility Support	5,388	5,672	5,437	- 4
Total, Technology and Systems Development	$ 27,396	$ 25,804	$ 26,114	+ 1

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II. B. Major Laboratory and Facility Funding

	FY 1989	FY 1990	FY 1991	% Change
Los Alamos National Laboratory	$ 12,015	$ 11,988	$ 12,452	+ 4
Sandia National Laboratories	$ 10,600	$ 8,511	$ 8,688	+ 2
Mound Facility	$ 819	$ 850	$ 813	- 4
Brookhaven National Laboratory	$ 870	$ 1,281	$ 1,153	- 10
Oak Ridge National Laboratory	$ 406	$ 425	$ 410	- 4
Lawrence Livermore National Laboratory	$ 1,166	$ 1,500	$ 1,441	- 4

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Technology and Systems Development			
Science and Technology Base Development	Developed technology oriented to DOE safeguards and security objectives, policies, cost effectiveness, and user needs. Applied integrated physical security and Materials Control and Accounting systems concepts utilizing high technology to provide protection against the full spectrum of threats including sabotage, espionage, and theft of highly attractive material in DOE complex.	Continue development of technology necessary to achieve DOE safeguards and security objectives and policies that address DOE-wide multifacility user needs in a cost effective manner and on a priority basis.	Maintains FY 1990 level of effort. Additionally, on a priority basis, there will be activities directed at investigating emerging and innovative technologies capable of providing protection against the full spectrum of threats to the DOE complex.
	Developed physical protection concepts for new DOE programs and materials. Investigated equipment and concepts for performance, maintenance, and operational efficiency. Developed advanced technologies such as artificial intelligence and expert systems.	Continue the technological base program of physical security at a substantially reduced level of effort. Reduction in efforts to test and evaluate existing technologies, such as exterior and interior sensors. Develop innovative ideas for application of existing and emerging security systems, for solving existing and emerging security concerns, and for coping with changing or newly emerging threats. New efforts include the application of neural networks to security problems; maintaining expertise in airspace monitoring technologies; demonstrating fiber optic sensor systems; and	Maintains FY 1990 level of effort. Ongoing activities include maintaining a marginal level of awareness in state-of-the-art, cost-effective technologies such as intrusion detection, access delay, entry control, explosives and contraband detection, communications, display and control, and video systems; developing and evaluating prototype systems to improve the overall protection of classified matter with respect to its storage, movement, access, and accountability; testing, evaluating, and enhancing a prototype applied image processing system to provide automated inspection

III. Technology and Systems Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Science and Technology Base Development (Cont'd)		developing a laser radar imager.	and control protection over personnel and Special Nuclear Material movements within DOE nuclear facilities; testing and evaluating a prototype early warning system; and designing a fabricating prototype system that will reduce insider tampering with security systems. A new effort will be started to test intrusion detection sensors based on the Piezo film technology.
	Improved material measurement performance by incorporating advances in electronic and computer technologies. Expanded operational application of nuclear measurement instruments.	Continue the development of the nuclear materials measurement technology base at a reduced level. Develop improved electronic and computer technologies and equipment for nondestructive assay applications to meet needs of existing and new programs and facilities. Defer detector evaluation, software development, and reference material characterization.	Continues, at a reduced level of effort, the base program in nuclear materials accounting which includes development of state-of-the-art nondestructive assay, calorimetric, chemical and isotopic analysis measurement methods and instruments to achieve timely, effective safeguards in compliance with the performance requirements of DOE Order 5633.3. Base activities will continue in the development of instrumentation and methods for in-plant holdup, confirmatory, and inventory verification measurements; develop cost-effective calibration standards and methods of measurement control to insure that nondestructive assay instruments are performing within their design limits; develop technology for designing and implementing efficient, cost-effective, and automated database collection and information systems; and develop software products that will aid the DOE complex in the design and evaluation of modernized material control and accounting systems to detect and resolve anomalies.

III. Technology and Systems Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Science and Technology Base Development (Cont'd)	Developed material control technology to monitor nuclear material for personnel access and for surveillance of material and personnel. Developed measurement techniques for additional forms of plutonium and uranium associated with ongoing and new technologies.	Provides reduced effort in development of nuclear materials detection, verification, surveillance, and confirmatory measurement techniques. Continue personnel and vehicle monitoring technology development for nuclear materials and personnel movement and access.	Continues, at reduced level of effort, the nuclear materials control base program. Develops techniques for controlling and tracking materials that can be interfaced with materials accounting and physical protection subsystems to maximize total safeguards system effectiveness in upgraded and/or modernized facilities; develops a nuclear materials tracking system (NTRAK) for fence and exterior applications.
	$ 12,328	$ 10,043	$ 10,380
Computer Security	Tested and examined Wide-Band Communications Network software and enhancements to assure ongoing secure operation. Enhanced user authentication efforts. Developed methods for secure distribution of software packages.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort.
	Developed computer-based risk analysis tool. Supported field sites through computer security enhancement reviews, education programs, and continued development of field assistance tools. Initiated testing of formal DOE classified computer security program. Resolved use of intelligence workstations for classified work. Developed artificial intelligence methodology to analyze accountability records.	Distribute a computer-based risk analysis tool, provide enhancements as required. Continue to provide enhanced computer security education and awareness programs, continue development and enhancement of field assistance tools, and continue to provide computer security enhancement reviews.	In addition to FY 1990 level of effort, assist field in assurance of security properties of computer software and hardware.
	Supported the implementation of revised policy for classified computer security. Provided support to field, as appropriate.	Continue review of policy, program planning, and standards and criteria documents to assure latest information available is applied to computer security issues.	Continues to develop, enhance, and aid in the use of computer-based products for security activities. Conducts training seminars and enhancement reviews.

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III. Technology and Systems Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Computer Security (Cont'd)	Initiated testing of newly developed methods of security network facilities. Conducted development activities in secure computer networking, telecommunications, and authentication techniques to address ongoing computer security concerns.	Continue to provide support of field offices through the accreditation/reaccreditation process. Assist field offices with the technical solution of problems. Continue the use of field personnel in cooperative efforts.	Provide support to field offices and the accreditation/reaccreditation of classified computer systems. Coordinate DOE and other agency resources to computer security efforts.
	In conjunction with field offices, perform management evaluations of site computer security programs.	In addition to FY 1989, also correct site and nationwide problems and formulate program initiatives.	Performs management evaluations of site computer security programs. Develops data base of computer security activities. Advises departmental elements and computer community of problems, solutions, and initiatives.
	No activity.	Testing of methods to assure that the latest technology provides adequate protection for the transmission of classified data. Conduct research and development in computer networking, telecommunications, and authentication techniques.	Collects, develops, and distributes data on intrusion techniques for distributed Automated Data Process Systems. Develops computer-aided instruction software. Develops software for security profile analysis. Analyzes computer viruses, covert channels, etc. Improves local area network security properties.
	$ 3,250	$ 3,757	$ 3,811
Basic Systems Design, Integration and Evaluation	Directed initiatives toward cost effectiveness, operational efficiencies, and standardization. Examples follow:	Initiatives are directed toward cost effectiveness, operational efficiencies, and standardization. Examples follow:	Initiatives are directed toward cost effectiveness, operational efficiencies, and standardization. Examples follow:
	Integrated Physical Protection and Material Control and Accountability (MC&A):	Integrate Physical Protection and MC&A:	Integrates Physical Protection and MC&A:
	Joint laboratory effort developed systematic methods to integrate physical protection, material control, and material accounting.	Develop specification and conceptual design for integrated MC&A, process monitoring, and material management and safeguards systems.	Tests and evaluates demonstration system for integrating MC&A, process monitoring, and materials management and safeguards systems.

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III. Technology and Systems Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Basic Systems Design, Integration and Evaluation (Cont'd)	The MC&A technology was fine-tuned to update flows, measurement places, and computerized data/information file for use by the Office of Safeguards and Security field operations.	Continue MC&A technology initiative to computerize production process flows and measurement points, identify improvements in measurements which, combined with other material control and physical security, will mitigate insider threat.	Maintains FY 1990 level of effort. Additionally, develops advanced integrated security system for New Production Reactor. Participates in overall security design for Special Isotope Separation process.
	Standardize Systems Design:	Standardize Systems Design:	Standardize Systems Design:
	Developed standardized facility, equipment, and system design, minimizing modifications for site-specific application.	Continue at FY 1989 level of effort.	Provides support in verification reviews of safeguards and security upgrade projects throughout the DOE complex.
	Developed criteria for standard methods for calculation of statistical-based inventory difference control limits by analysis of measurement uncertainties.	Define and develop standardized inter-facility compatible personnel access/control and security system.	Supports transfer of standardized inter-facility compatible personnel access control and security systems to facilities.
	Performance Criteria Guides and System Evaluation Methods:	Performance Criteria Guides and System Evaluation Methods:	Performance Criteria Guides and System Evaluation Methods:
	Developed consistent DOE-wide calorimetric assay capability to minimize inventory and shipper-receiver differences caused by instrument calibration differences and operating procedures.	Continue development of improved DOE-wide calorimetric assay instrumentation, techniques, and measurement control to minimize inventory and shipper-receiver differences and measurement time.	Further development of improved DOE-wide calorimetric assay instrumentation, techniques, and measurements to minimize inventory and shipper/receiver differences and to decrease measurement times.
	Developed computer modeling concepts for planning, cost analysis, and validating safeguards and security systems.	Defer activities to FY 1991.	Development and refinement of computer-based modeling and simulation tools used to design and evaluate alternative physical security systems, cost analysis, and systems validation. Maintain MC&A computer simulation efforts in this area.

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III. Technology and Systems Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Basic Systems Design, Integration and Evaluation (Cont'd)	Developed NCSA performance criteria, permitting facilities to implement consistent protracted diversion standards.	Continue development of NCSA performance criteria and guides.	Identifies and evaluates other sources of data, such as process records and physical security alarms that can be incorporated into NCSA systems to meet performance.
	$ 6,430	$ 6,332	$ 6,486
Onsite Test and Evaluation and Facility Support	Continued focusing on high-priority items evolving from the technology base. Emphasis will be applied to cost effectiveness, user needs, and operational efficiency. Examples are as follows:	Continue at FY 1989 level of effort. However, NCSA, onsite testing, and evaluation will be at a reduced level of effort. Examples are as follows:	Maintains FY 1990 level of effort.
	Facility Process Modeling:	Facility Process Modeling:	Facility Process Modeling:
	Evaluation of prototype insider protection system.	Evaluation of facility impact and benefits of integrated insider protection systems will continue.	Maintains FY 1990 level of effort.
	Field Consultation and Demonstration of Advanced Systems:	Field Consultation and Demonstration of Advanced Systems:	Field Consultation and Demonstration of Advanced Systems:
	Tested and evaluated high resolution emission spectrometry for the assay of uranium, plutonium, and selected isotopes of fuel dissolver solution.	Demonstration and evaluation of high resolution emission spectrometry for the in-line assay of uranium, plutonium, and selected isotopes in fuel dissolver solution.	Maintains FY 1990 level of effort.
	Demonstrated techniques for measuring/estimating nuclear material holdup, instrument calibration, and analyzing holdup data.	Defer activities to FY 1991.	Test confirmatory measurements for several types of nuclear materials with emphasis on shipments/receipts of nuclear materials.

III. Technology and Systems Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Onsite Test and Evaluation and Facility Support (Cont'd)	Demonstrated integrated MC&A, physical security concepts, and integrated nondestructive assay techniques for uranium and plutonium processing facilities for operational impact, cost effectiveness, and performance objectives.	Conduct limited in-plant operation evaluation of improved nondestructive assay measurement technology for uranium and plutonium process facilities.	Continues activity at reduced level of effort.
	Tested and evaluated improved vehicle and pedestrian nuclear material and contraband monitors at the DOE facility access points.	Demonstrate and evaluate improved package, vehicle and pedestrian, nuclear materials, and contraband portable monitors at the DOE weapon facilities access points.	Maintains FY 1990 level of effort.
	Technology Transfer, Training, and Workshops:	Technology Transfer, Training, and Workshops:	Technology Transfer, Training, and Workshops:
	DOE-wide support and training in MC&A, physical security, and vulnerability analysis.	Provide reduced DOE-wide support and training courses on the use of new MC&A and safeguards technology and methodology; conduct physical protection workshops.	Maintains FY 1990 level of effort.
	No activity.	Provide additional systems level assistance to the field.	Continues systems level field assistance.
	$ 5,388	$ 5,672	$ 5,437
Technology and Systems Development	$ 27,396	$ 25,804	$ 26,114

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR SAFEGUARDS AND SECURITY

I. Preface: International

This program seeks to improve the effectiveness and efficiency of International Atomic Energy Agency safeguards and foreign physical protection to ensure that declared non-military nuclear materials and facilities worldwide are used only for peaceful purposes. The program provides a technical basis for U.S. nonproliferation and national security policy to prevent the spread of nuclear weapons. Four key categories include work at seven DOE contractor facilities. The four key activities include: (1) studies to define and plan for development of safeguards systems for generic types of fuel cycle facilities, and development of necessary inspection methods and techniques; (2) development of equipment, instruments, and technology for assay of nuclear materials in bulk and sample form, and monitoring by containment and surveillance to maintain continuity of knowledge of material integrity; (3) provision of training in safeguards and physical protection for staff of non-U.S. organizations as required by the Nuclear Non-Proliferation Act of 1978; and (4) field trials of safeguards concepts, procedures, and equipment, and joint research and development under bilateral agreements between DOE/Office of Safeguards and Security and non-U.S. organizations, as required to establish the performance and gain international acceptance of advanced safeguards concepts and equipment; and bilateral cooperation, including joint research and development, to ensure adequate physical protection for nuclear materials and facilities.

II. A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
System Studies, Safeguards Designs and Strategies	$ 1,865	$ 1,955	$ 1,973	+ 1
Technology Development	780	730	748	+ 2
Nuclear Non-proliferation Act	870	635	811	+ 28
Technology Exchanges	1,835	1,835	1,572	- 14
Total, International	$ 5,350	$ 5,155	$ 5,104	- 1

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II. B. Major Laboratory and Facility Funding

	FY 1989	FY 1990	FY 1991	% Change
Los Alamos National Laboratory	$ 2,640	$ 2,452	$ 2,393	- 2
Sandia National Laboratories	$ 1,810	$ 1,789	$ 1,744	- 3
Mound Facility	$ 55	$ 55	$ 51	- 7
Brookhaven National Laboratory	$ 420	$ 360	$ 335	- 7
Martin Marietta Energy Systems	$ 125	$ 171	$ 236	+ 38
Oak Ridge National Laboratory	$ 90	$ 93	$ 90	- 3
Lawrence Livermore National Laboratory	$ 210	$ 235	$ 255	+ 9

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International			
System Studies, Safeguards Designs and Strategies	Defined measures for detecting production of highly enriched uranium in Atomic Vapor Laser Isotope Separation (AVLIS) facilities and reviewed AVLIS process design changes for impact on International Atomic Energy Agency safeguards approach.	Revise safeguards approaches for highly enriched uranium detection based on AVLIS process changes. Analyze safeguards measurement system requirements and ensure that the process can accommodate International Atomic Energy Agency safeguards on cost-effective basis.	Supports Enrichment Plant Safeguards Review Group activities in the area of enrichment safeguards. Develops safeguards methods and implementation for use by AVLIS Plan and support safeguards measurements technology demonstrations. Performs compatibility study of domestic and international safeguards approaches.
	Defined safeguards concepts for verification of mixed-oxide fuel at light water reactors, fast breeder reactors, and fuel fabrication facilities.	Continue development of safeguards approaches for advanced fuel cycle facilities.	Maintains FY 1990 level of effort.
	Increased study of potential safeguards concepts for U.S. spent fuel storage strategies.	Develop complete safeguards approaches for U.S. spent fuel storage strategies and revise safeguards concepts as needed.	Maintains FY 1990 level of effort, plus develops methods for direct measurement of fissile content of spent fuel elements and refine technologies for indirect measurements of spent fuel.
	Participated in large-scale reprocessing (LASCAR) program activities for development of safeguards approaches for commercial reprocessing plants.	Continue at FY 1989 level of effort.	Participates in LASCAR program activities. Conducts international workshop on near real-time accounting. Field tests independent verification and statistical data methods.

III. International (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
System Studies, Safeguards Designs and Strategies (Cont'd)	Initiated study of relationship between process monitoring and international safeguards for reprocessing facilities.	Complete study of relationship between process monitoring and international safeguards for reprocessing facilities.	Development and testing of statistical methods at reprocessing facilities.
	Supported the DOE international safeguards efforts through participation in International Atomic Energy Agency Advisory Group and Consultants Meetings.	Continue at FY 1989 level of effort.	Provides support to DOE initiatives to improve international safeguards.
	$ 1,865	$ 1,955	$ 1,973
Technology Development	Continued development of advanced surveillance systems including digital recording, optical disk recording, fiber optic transmission, and authentication.	Continue development of advanced surveillance systems. Extend technology base for authentication of operator-provided equipment.	Maintains FY 1990 level of effort.
	Continued evaluation of state-of-the-art video recorders and cameras.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort.
	Explored sealing and inventory tracking devices for selected areas of the fuel cycle.	Continue at FY 1989 level of effort.	Develops a PC-based reusable in-situ verifiable general purpose seal.
	Demonstrated and documented strategy for use of calorimetry under realistic field conditions.	Calibration of calorimeters at safeguards performance laboratory and development of proposals for plutonium nondestructive assay experiments using calorimeters.	Conducts in-field performance exercise for calorimeters and improves mode of operation of calorimeters.
	Developed prototype instruments for detection of highly enriched uranium in AVLIS separators.	Develop and evaluate instrumentation for use in AVLIS facilities.	Maintains FY 1990 level of effort.
	Developed nondestructive assay equipment for use in mixed-oxide fuel fabrication facilities and reprocessing plants.	Continue FY 1989 level of effort and improve destructive and nondestructive analysis of dissolver solutions in reprocessing plants.	Maintains FY 1990 level of effort.

III. International (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Technology Development (Cont'd)	$ 780	$ 730	$ 748
Nuclear Non-proliferation Act	Presented Eighth International Training Course on Physical Protection.	Complete plans for presenting Ninth International Training Course on Physical Protection.	Plans and prepares for Tenth International Training Course on Physical Protection.
	Presented International Training Course on State Systems of Accounting and Control of nuclear materials. Participated as appropriate in other regional training courses.	Plan and prepare materials for FY 1991 course and regional courses as funds permit.	Maintains FY 1990 level of effort and fully participates in the State Systems of Accounting and Control regional courses.
	$ 670	$ 635	$ 811
Technology Exchanges	Continued joint research and development and evaluations of advanced safeguards technology and equipment to facilitate their transfer to and use by the international safeguards community.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort.
	In cooperation with the Federal Republic of Germany, completed development of Safeguards Performance Evaluation System for application of fuel fabrication facilities.	In cooperation with the Federal Republic of Germany, develop Safeguards Performance Evaluation System for application to reprocessing facilities.	Development of combined gamma-ray plus x-ray for determination of plutonium isotopics and joint evaluation of analytical codes with other countries.
	$ 1,835	$ 1,835	$ 1,372
International	$ 5,350	$ 5,155	$ 5,104

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR SAFEGUARDS AND SECURITY

I. Preface: Classification and Technology Policy

Program resources provide support to the Divisions of Classification and Policy and Program Operations for the preparation of classification guidance in nuclear weapons and other classified DOE program areas; for the development and implementation of orders and guidance for unclassified controlled information; for classification reviewers to assist in reviewing Freedom of Information Act requests and appeals involving classified or other sensitive information; for maintenance and enhancement of a computer data base of classification guidance and a computer-assisted classification review program; for classification appraisals of Headquarters and field offices; and for a program of education and training of all classifiers in DOE. Program resources are also used to review and authorize the exports of nuclear technology and nuclear-related materials and component consistent with U.S. laws and regulations; to provide technical and policy support for U.S. efforts to prevent the further spread of nuclear weapons and other nuclear military applications; and to provide technical support to other U.S. Government agencies involved in the control of unauthorized export of U.S. technology. Responsibilities in the above areas are fixed by statute (e.g., Atomic Energy Act of 1954, as amended; Nuclear Non-Proliferation Act of 1978, Export Administration Act of 1979, as amended), applicable rules, directives, Executive Orders, and international treaties or understandings.

II. A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Classification Resources	$ 2,525	$ 2,487	$ 2,995	+ 20
Export Control Resources	0	4,414	5,066	+ 15
Technology Commercialization Resources	0	1,000	0	-100
Total, Classification and Technology Policy	$ 2,525	$ 7,901	$ 8,061	+ 2

II. B. Major Laboratory and Facility Funding

	FY 1989	FY 1990	FY 1991	% Change
Brookhaven National Laboratory	$ 500	$ 0	$ 200	>999
Los Alamos National Laboratory	$ 128	$ 1,986	$ 2,000	+ 1
Oak Ridge (Y-12)	$ 41	$ 448	$ 200	- 55
Argonne National Laboratory	$ 79	$ 590	$ 200	- 66
Sandia National Laboratories	$ 0	$ 899	$ 1,000	+ 11
Lawrence Livermore National Laboratory	$ 100	$ 418	$ 600	+ 44
Pacific Northwest Laboratory	$ 20	$ 415	$ 260	- 37
Savannah River Laboratory	$ 15	$ 10	$ 250	>999

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Classification and Technology Policy			
Classification Resources			
Guidance and Review	Supported field liaison and joint guidance development for existing and new technology.	Continue active support.	Maintains FY 1990 level of effort. Revise Inertial Confinement Fusion Guide.
	Conducted technical evaluation of classification policies in nuclear weapons and special nuclear materials areas.	Provide guidance as required for nuclear materials, weapons, and safeguards and security areas.	Maintains FY 1990 level of effort.
	Maintained a limited document review program (Freedom of Information Act, mandatory, and systematic reviews).	Continue at FY 1989 level of effort.	Establish a responsive document review program.
	Supported a comprehensive review of all militarily critical technology subject to classification or Unclassified Controlled Nuclear Information control.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort.

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III. Classification and Technology Policy (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Guidance and Reviews (Cont'd)	Investigated and identified statutes or regulations for control of export technology.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort.
	Declassified Restricted Data as well as Formerly Restricted Data information according to provisions of the Atomic Energy Act of 1954, as amended, Section 142.	Reduce level of FY 1989 activity.	Maintains FY 1990 level of effort.
	No activity.	Initiate Classification Policy Study.	Will complete Classification Policy Study.
	$ 1,565	$ 1,305	$ 1,426
Appraisals	Supported the field appraisal program.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort and initiate Headquarters appraisal program.
	$ 215	$ 204	$ 270
Education	Maintained classification education program for authorized classifiers and training courses for classification officers and analysts.	Increase active support effort over FY 1989 level of effort.	Maintains FY 1990 level of effort and expand performance based testing.
	$ 270	$ 397	$ 521
Automation	Maintained level of effort in Classification Guidance System. Developed a Classification Guidance System for personal computer use.	Continue at FY 1989 level of effort and introduce a technical thesaurus.	Maintains FY 1990 level of effort and introduces a dictionary of terms used in classification guidance.
	Continued automation support of the various functions in the Office.	Continue at FY 1989 level of effort.	Maintains FY 1990 level of effort.
	$ 275	$ 383	$ 582

III. Classification and Technology Policy (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Unclassified Controlled Nuclear Information and Official Use Only Information	Generated new and/or updated existing guidance in all UCNI areas and other unclassified controlled information.	Issue and revise guidance as required in a timely manner.	Maintains FY 1990 level of effort.
	$ 200	$ 196	$ 196
Subtotal, Classification Resources	$ 2,525	$ 2,487	$ 2,995
Export Control Resources	This activity funded under Verification and Control Technology.	Maintain the capability to review and process 15,000 export applications.	Maintains FY 1990 level of effort.
		Represent the U.S. at the International Export Coordinating Committee and support the updating of the International Export Control Coordinating Committee Atomic Energy List.	Maintains FY 1990 level of effort.
		Review Nuclear Regulatory Commission export and nuclear material retransfer applications.	Maintains FY 1990 level of effort.
		Continue national security/ nonproliferation research activities to support Subgroup on Nuclear Export Coordination.	Maintains FY 1990 level of effort.
		Initiate export control study to address changing policies regarding Eastern Europe.	Develop new export control criteria in light of new political environment.
		Conduct nonproliferation workshops and conferences on advanced proliferation policy.	Maintains FY 1990 level of effort.

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III. Classification and Technology Policy (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Export Control Resources (Cont'd)		Support nuclear technology security missions including Militarily Critical Technology List and Nuclear Technologies Reference Book.	Maintains FY 1990 level of effort.
		Implement procedures, analysis, review, and processing for foreign visits/assignments.	Maintains FY 1990 level of effort plus initiates implementation of DOE Order 1240.2A for processing of visits and assignments of foreign nationals.
		Publish and expand the scope of the Critical Technologies Newsletter. Revise the Technology Transfer Fact Book, as required.	Maintains FY 1990 level of effort.
		Participate in interagency development of verification protocols and onsite challenge inspection regime for intermediate range nuclear forces, strategic arms reduction talks, and defense and space talks.	Participates in the scientific and technical information (STI) activities at DOE. Restricts STI activities to those functions and responsibilities that pertain only to DP missions.
		Generate and upgrade guidance on the applicability of DOE-funded technology for release to the U.S. public and/or foreign nationals.	Maintains FY 1990 level of effort plus develops and starts implementation of the Sensitive Country Advisory Program.
		No activity.	Restructures DOE travel responsibilities to preclude analysis of all sensitive requests and concentrates only on a fraction of DOE travel. Eliminates records for determining reciprocity.
		No activity.	Maintains a technical assistance data base for nonproliferation and technology transfer.
	$ 0	$ 4,414	$ 5,066

III. Classification and Technology Policy (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Technology Commercialization Resources	This activity funded under Verification and Control Technology.	Establish formal procedures for implementing DOE technology commercialization program. Establish a formal appraisal program to identify candidate technologies with greatest potential for success. Modify existing statutes, orders, and procedures to encompass DP objectives. Establish informational/educational program to increase U.S. industry awareness of Defense Programs goals and objectives.	This activity funded under the Research and Development portion of the Weapons Activities budget.
	$ 0	$ 1,000	$ 0
Classification and Technology Policy	$ 2,525	$ 7,901	$ 8,061

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR SAFEGUARDS AND SECURITY

I. Preface: Program Direction

The Program Direction activity provides funds for salaries, benefits, travel, training, and other related costs for the Nuclear Safeguards and Security and Security Investigations decision units. Organizationally, activities are conducted by the Office of Safeguards and Security and the Office of Classification and Technology Policy. The Office of Safeguards and Security is the single manager for safeguards and security in the DOE. The Office of Safeguards and Security mission is to ensure adequate protection for nuclear weapons, test devices, weapons components, special nuclear material, Government-owned nuclear facilities, and classified information under the DOE control. In addition, the Office of Safeguards and Security participates in programs of international cooperation designed to reduce the risk of proliferation of nuclear weapons. The Office of Classification Technology and Policy is responsible for identifying classified and unclassified sensitive information critical to the national security, and to control nuclear related exports.

II. A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Program Direction	$ 8,636	$ 9,332	$ 9,693	+ 4
Total, Program Direction	$ 8,636	$ 9,332	$ 9,693	+ 4

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Program Direction	Program Direction provided 139 full-time equivalents (FTE's) to carry out activities of the Office of Safeguards and Security, Office of Classification and Technology Policy, and Security Investigations.	Continues FY 1989 level of effort. Also provides 2 additional FTE's in Personnel Security and Classification to support Headquarters activities.	Maintain FY 1990 level of effort.
	139.0 FTE $ 8,636	141.0 FTE $ 9,332	141.0 FTE $ 9,693
Program Direction	139.0 FTE $ 8,636	141.0 FTE $ 9,332	141.0 FTE $ 9,693

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR SAFEGUARDS AND SECURITY

I. Profile: Capital Equipment

Capital Equipment provides for direct field support of the Nuclear Safeguards and Security programs, the New Brunswick Laboratory, nuclear material measurement and analysis for international and domestic safeguards, technology and systems development in the Office of Safeguards and Security, security countermeasures, computer security test and evaluation, and physical security for domestic safeguards.

II. A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Capital Equipment	$ 4,620	$ 4,892	$ 5,066	+ 4
Total, Capital Equipment	$ 4,620	$ 4,892	$ 5,066	+ 4

II. B. Major Laboratory and Facility Funding

	FY 1989	FY 1990	FY 1991	% Change
Los Alamos National Laboratory	$ 1,345	$ 1,326	$ 1,430	+ 8
Sandia National Laboratories	$ 1,078	$ 1,129	$ 1,215	+ 8
Nevada Operations Office	$ 135	$ 145	$ 150	+ 3
Richland Operations Office	$ 0	$ 460	$ 460	0
New Brunswick Laboratory	$ 433	$ 360	$ 250	- 31
Lawrence Livermore National Laboratory	$ 230	$ 165	$ 130	- 21
Oak Ridge National Laboratory	$ 173	$ 180	$ 185	+ 3
Department of Energy Headquarters	$ 1,033	$ 923	$ 1,091	+ 18

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III. Activity Descriptions: (Nav BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Capital Equipment	Supported technology development and operational support activities. Also provided for design and replacement of the existing security alarm systems in both the Forrestal and Germantown office buildings.	Continue technology development and operational support activities. Continue design and replacement of the existing security alarm systems in both the Forrestal and Germantown office buildings.	Maintains technology development and operational support activities. Provides for maintenance of the existing security alarm systems in both the Forrestal and Germantown office buildings.
	$ 4,620	$ 4,892	$ 5,066
Capital Equipment	$ 4,620	$ 4,892	$ 5,066

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR SAFEGUARDS AND SECURITY

I. Preface: Construction

II. A. Summary Table

Program Activity	FY 1989 Actual	Revised Estimate	FY 1991 Request	% Change
Construction	$ 0	$ 0	$ 2,000	+100
II. B. Major Laboratory and Facility Funding				
GPO-186, Central Training Academy, Albuquerque, NM	$ 0	$ 0	$ 2,000	+100

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Construction	No activity.	No activity.	Provides for needed facility upgrades consistent with the site development plan and to meet ESH requirements at the CTA. Upgrades are required to prevent further deterioration of the CTA facility and allow for more effective onsite training.
	$ 0	$ 0	$ 2,000
Construction	$ 0	$ 0	$ 2,000

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Nuclear Safeguards and Security

IV. A. Construction Project Summary

Project No.	Project Title	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Unappropriated Balance	TEC
GPD-186	General Plant Projects Central Training Academy Albuquerque, New Mexico	$ 0	$ 0	$ 2,000	$ 0	$ 2,000

26-657 O—90—10

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Nuclear Safeguards and Security

IV. B. Plant Funded Construction Projects

1. Project title and location: GPD-186, General Plant Projects
Central Training Academy, Albuquerque, New Mexico

Project TEC: $2,000
Start Date: 1st Qtr. FY 1991
Completion Date: 4th Qtr. FY 1992

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1991	$ 2,000	$ 2,000	$ 1,000
1992	0	0	1,000

3. Narrative:

(a) The highest priority General Plant Projects required include utility restoration and replacement. This request is the minimum level required to prevent further deterioration of the Central Training Academy facilities.

(b) Proposed projects have been evaluated for flood hazards with no hazards currently evident. At the time project authorization is requested, each project will again be re-evaluated. Environmental assessments will also be required for each of the proposed projects.

(c) All projects included in this budget have been reviewed by management and are considered necessary for the continued safe and adequate operation of the Central Training Academy.

4. Total Project Funding (Cost):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 1,000	$ 1,000

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VOLUME I

SECURITY INVESTIGATIONS

OVERVIEW

SECURITY INVESTIGATIONS

The mission of the Security Investigations program is to ensure that the common defense and security of the United States will not be endangered by the granting of security clearances to the Department of Energy and contractor personnel who, in the performance of their work, must have access to Restricted Data, National Security Information, or Special Nuclear Material, or who occupy a designated Critical Sensitive position.

The demands upon the Security Investigations Program have increased significantly due to the institution of the Personnel Security Assurance Program (PSAP) and increased activities at Savannah River and Rocky Flats; and the commitment to process the entire backlog of reinvestigations by FY 1993. PSAP increases the frequency of reinvestigations for personnel in sensitive positions. Increased activities at Savannah River associated with reactor restart and the New Production Reactor; and at Rocky Flats associated with operational improvements in the area of environment, safety, and health require additional personnel which increases the initial investigations.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

LEAD TABLE

SECURITY INVESTIGATIONS

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
Operating Expenses:						
Security Investigations	$43,288 a/	$40,582 c/	$40,582	$65,000	+24,418	+60
Total	$43,288	$40,582	$40,582	$65,000	+24,418	+60
Staffing (FTE'S)	b/	b/	b/	b/	b/	

a/ FY 1989 appropriation $40,000,000. Reflects $3,288,000 of current year funds in a reprogramming action.

b/ Staffing for this activity is included under Nuclear Safeguards and Security decision unit.

c/ FY 1990 appropriation $41,200,000. Reflects sequestration of $618,000 to comply with the Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177).

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

SUMMARY OF CHANGES

Security Investigations

FY 1990 Appropriation	$ 40,582
Adjustments	0
FY 1991 Base	$ 40,582
Security investigations	
FBI investigations decrease by 33 cases; however, price increases by $135 a case	+11
- OPM full-field investigations increase by 702 cases and price increases by $180 a case	+3,974
- OPM reinvestigations increase by 11,361 cases:	
--Full implementation of PSAP and increased activities at Savannah River and Rocky Flats	+20,230
- National Agency checks increase by 9,947 cases with a price increase of $1 a case	+213
FY 1991 Congressional Budget Request	$ 65,000

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY-DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

SECURITY INVESTIGATIONS

I. Preface: Security Investigations

Funds are primarily used to reimburse the Federal Bureau of Investigation and the Office of Personnel Management for the conduct of Department of Energy-sponsored investigations. The investigations are used as a basis to determine whether individuals are an acceptable security risk for access to classified data and/or special nuclear materials. Such determinations are required by the Atomic Energy Act of 1954, as amended, and Executive Orders. Additionally, some funds will be provided for other agencies as needed to support the Security Investigations program.

The FBI conducts investigations for those DOE and DOE Contractor employees who have "Q" Sensitive clearances that are designated as being of a "high degree of importance or sensitivity." OPM conducts all other investigations on these employees.

A "Q sensitive" position requires a full field investigation that covers at least the most recent 15 years. This may be either a full field background investigation by the FBI or a special background investigation by OPM. If the position has been designated as being of a "high degree of importance or sensitivity," the investigation is carried out by the FBI.

For a "Q Nonsensitive," a full field investigation is required by OPM with the National Agency Check as a portion of the investigation.

National Agency Check and Inquiries are conducted for all Federal employees and National Agency Check with Credit for non-Federal employees. These are performed by the Office of Personnel Management. They permit an individual access, on a "need-to-know" basis to Confidential Restricted Data, Secret and Confidential Formerly Restricted Data, and to Secret and Confidential National Security Information required in the performance of their duties.

II. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Security Investigations	$ 43,288	$ 40,582	$ 65,000	+60

II. B. Major Laboratory and Facility Funding

Department of Energy Headquarters	$ 43,288	$ 40,582	$ 65,000	+60

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Federal Bureau of Investigation Background Investigations	Completed 570 full-field background investigations and approximately 130 reinvestigations at $2,300 per case.	Schedule approximately 433 full-field background investigations and approximately 300 reinvestigations at $2,550 per case.	Schedule approximately 500 initial investigations and 200 reinvestigations at $2,685 per case.
	$ 1,610	$ 1,869	$ 1,880
Office of Personnel Management Background Investigations	Completed 12,366 full-field background investigations at $1,725 per case. Reprogramming provided $2,262,000 for approximately 1,131 additional full-field background investigations at $2,000 per case.	Schedule approximately 12,602 full-field background investigations at $2,250 per case.	Fully funds estimated need for 13,304 full-field background investigations at $2,430 per case.
	$23,593	$28,354	$32,328
Office of Personnel Management Background Reinvestigations	Completed 19,744 reinvestigations at an average cost of $850 per case. Reprogramming provided $1,026,000 for reinvestigations of 986 cases at an average of $1,045 per case.	Schedule approximately 8,789 reinvestigations at an average cost of $1,150 per case.	Funds an estimated 20,150 cases at an average of $1,505 per case. The cost varies depending on the type of reinvestigation requested--special background or limited background. The increase is necessary due to implementation of PSAP as well as increased activities at Savannah River and Rocky Flats.
	$ 17,809	$ 10,107	$ 30,337
National Agency Checks	Scheduled approximately 18,300 National Agency Checks at $15 per case.	Schedule approximately 14,000 National Agency Checks at $18 per case.	Fully funds estimated need for 23,947 National Agency Checks at $19 per case.
	$ 276	$ 252	$ 455
Total, Security Investigations	$ 43,288	$ 40,582	$ 65,000

VOLUME 1

NEW PRODUCTION REACTORS

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DEPARTMENT OF ENERGY

FY 1991 CONGRESSIONAL BUDGET REQUEST

ATOMIC ENERGY DEFENSE ACTIVITIES

VOLUME 1

NEW PRODUCTION REACTORS

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES

OVERVIEW

NEW PRODUCTION REACTORS

Mission

The Office of New Production Reactors (NP) is responsible for the design and construction of new production reactors to meet national security requirements. This office provides for the planning, development, and execution of a program to ensure that it is done safely, efficiently, and in an environmentally sound way.

Program Requirements

Long-range plans for the production of nuclear materials are based on the need to eventually replace current aging production capacity. New production capacity is required to assure a certain and reliable supply of nuclear materials, primarily tritium, to maintain the Nation's nuclear deterrent. Nuclear reactors are the only proven and practical source of producing tritium, which is an essential component for modern nuclear weapons. Tritium decays at the rate of 5.5 percent annually, and without replacement, the Nation's nuclear deterrent will become ineffective.

Tritium production requirements cannot be met reliably with existing production reactor facilities located at the Savannah River Site (SRS) where the over 30-year old production reactors are experiencing aging effects that reduce their operational reliability. The reliability of the SRS reactors is expected to continue to be problematical during the approximate 10-year time period required to provide new production reactor capacity.

This program plans to proceed on an urgent schedule with preparation of an Environmental Impact Statement (EIS) concurrent with confirmatory development and project design activities. The plan is to proceed when the Record of Decision (ROD), which considers all of the Nation's costs and benefits, has been thoughtfully weighed. Two preferred reactor technologies and sites, a Heavy Water Reactor (HWR) at the Savannah River Site and a Modular High-Temperature Gas-Cooled Reactor (MHTGR) plant at the Idaho National Engineering Laboratory are under consideration. Engineering activities will be tailored to maintain the preferred reactor technologies on the same schedules for start of construction. As a contingency, and to fairly evaluate all reasonable alternatives, Light Water Reactor (LWR), such as WNP-1, tritium target development activities will be pursued.

The preferred technologies and sites are based on: (1) an assessment of candidate technologies made by the Energy Research Advisory Board; (2) an evaluation of candidate Department of Energy sites conducted by the Site Evaluation Team; (3) an evaluation of comparative costs by the NP Capacity Cost Evaluation Team; and (4) consultations made with key agencies within the Administration. A final decision on new production reactor capacity technologies and sites will be made after completion of an EIS and a formal ROD.

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Safety, quality, environmental, and performance factors are primary considerations in the design, construction, and operation of new production reactors. New production reactors will:

- Provide a level of safety that meets or exceeds that afforded to the public by licensed commercial nuclear power plants.
- Meet or exceed the applicable federal, state, and local regulations and requirements relating to environment, safety, and health.
- Provide a level of plant performance and operational reliability which assures the Nation's defense requirements are met.

Summary

Funding in recent years has been at a level sufficient for studies, some confirmatory development work and initiation of design. The requested FY 1991 funding level is essential to support the broad range of activities necessary to bring new production reactor capacity on-line under an urgent schedule.

Funds are required in FY 1991 to support:

- Full compliance with National Environmental Policy Act (NEPA), which includes the preparation of an EIS.
- Development and implementation of the safety review process.
- Technical assessments and reviews of key reactor components and systems.
- Reactor technology development, including the development of safety and design criteria.
- Tritium target development for METGR and LWR.
- Preliminary (Title I) design.

The funding level supports all necessary near-term activities to begin construction of the selected technologies as soon as possible after the ROD and establishes a corresponding balance in the level of design detail between the various technologies and sites as follows:

- For the HWR, activities related to technology development, confirmatory engineering development, and site independent definitive design will be pursued to support initiation of construction as soon as possible after completion of an EIS and an ROD;
- For the METGR, activities related to technology development, confirmatory engineering development, tritium target development, and site independent definitive design will be pursued to support initiation of construction as soon as possible after the completion of an EIS and an ROD; and
- For the LWR, the design is currently well developed, and only activities related to: (1) support of the NEPA process; (2) tritium target development work; and (3) resolution of technical and institutional issues associated with LWP-1 will be pursued.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

LEAD TABLE

NEW PRODUCTION REACTORS

	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
New Production Reactors	$460,000	$290,448	$200,448	$132,900	$-67,548	-34%
Reactors Support	0	0	0	8,000	+ 8,000	a/
Capital Equipment	0	98,500	98,500	221,300	+122,800	+125%
Construction						
Total, New Production Reactors	$460,000	$298,948	$298,948	$363,000	+ 64,052	+21%
Staffing (FTE's)	19	105	105	115		

a/ Unable to calculate.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

SUMMARY OF CHANGES
NEW PRODUCTION REACTORS

FY 1990 Appropriation	$303,500
Adjustments	- 4,552
1991 Base	$298,948
Operating Expenses	
- Inflation	$+ 8,619
- Program Support	- 24,310
- Safety Review Process	- 3,320
- Confirmatory Development	- 29,958
- Tritium Target Development	+ 7,447
- Conceptual Design	- 29,437
- Environmental Compliance	- 3,464
- Program Direction	+ 7,075
Subtotal, Operating Expenses	$- 67,548
Capital Equipment	
- Capital Equipment Items for MAR, MHTGR and LWR technologies	$+ 8,800
Subtotal, Capital Equipment	$+ 8,800
Construction	
- Inflation	$+ 4,137
- Increase for continuation of new production reactor capacity, 88-D-154	+ 118,663
Subtotal, Construction	$+122,800
FY 1991 Congressional Budget Request	$ 363,000

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

NEW PRODUCTION REACTORS

I. Preface: New Production Reactors Support

New production reactor capacity will be used to produce nuclear materials, primarily tritium, to maintain the Nation's nuclear deterrent. The operations program includes the broad range of operating expense funded activities required to bring new production reactor capacity on-line.

Operating expense funded activities include site environmental evaluation studies; preparation of technical studies and documentation in support of the National Environmental Policy Act; safety technology development, reactor technology development, and safety analysis documentation; safety studies; development of design and construction planning documentation; component reliability demonstrations; and preparation of operating procedures and manuals. Program direction funding provides the financial resources to support the technical, scientific and managerial staff necessary to direct and administer the program. These funds provide for salary, benefits, travel, computer and contractor costs. There will be major increases in manpower to support the review of preliminary design work, expanded safety and quality assurance activities, and projected growth of site offices. Computer hardware acquisition, software programs and ADP training costs are heavy in FY 1991 due to start-up of the new program. The Program Direction funding also allows for the travel required for attendance at public hearings, and to the three reactor sites (Savannah River, Idaho and Richland), as well as permanent change of station expenses which include employee and family transportation, per diem, and temporary quarters costs, etc. These funds also support contractor personnel to provide specialized skills and support services.

Future operation of completed new production reactor capacity will be the responsibility of the Nuclear Materials Production (NMP) program.

II.A. Summary Table

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	%Change
HEAVY WATER REACTOR				
- Confirmatory Development	$14,540	$34,340	$16,600	- 52
- Conceptual Design	1,300	21,000	0	a/
Subtotal	$15,840	$55,340	$16,600	- 70
MODULAR HIGH-TEMPERATURE GAS-COOLED REACTOR				
- Confirmatory Development	$ 7,130	$19,170	$ 9,200	- 52
- Tritium Target Development	6,090	15,850	26,200	+ 65
- Conceptual Design	3,200	7,250	0	a/
Subtotal	$16,420	$42,270	$35,400	- 16
LIGHT WATER REACTOR				
- Tritium Target Development	$ 4,400	$24,700	$23,500	- 5
Subtotal	$ 4,400	$24,700	$23,500	- 5
ENVIRONMENTAL COMPLIANCE	10,170	11,290	8,300	- 26
SAFETY REVIEW PROCESS	3,150	10,540	16,000	- 14
PROGRAM SUPPORT	8,060	31,010	8,000	- 74
PROGRAM DIRECTION	1,960	17,290	25,100	+ 45
SUMMARY TOTAL:				
Confirmatory Development	$21,670	$53,510	$25,800	- 52
Tritium Target Development	10,490	40,550	49,700	+ 22
Conceptual Design	4,500	28,250	0	a/
Environmental Compliance	10,170	11,290	8,300	- 26
Safety Review Process	3,150	10,540	16,000	- 14
Program Support	8,060	31,010	8,000	- 74
Program Direction	1,960	17,290	25,100	+ 45
GRAND TOTAL	$60,000	$200,448	$132,900	- 34

a/ Unable to Calculate.

II.B. Major Laboratory and Facility Funding

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	%Change
Albuquerque Operations Office	$ 8,630	$ 25,600	$ 15,800	- 38
Chicago Operations Office	16,080	49,750	13,200	- 73
Idaho Operations Office	13,380	30,820	31,800	+ 3
Oak Ridge Operations Office	3,650	10,020	4,030	- 60
Richland Operations Office	7,080	29,795	25,360	- 15
San Francisco Operations Office	1,420	4,140	0	a/
Savannah River Operations Office	8,220	14,290	3,900	- 73
Headquarters, other Field Offices, and other Labs/Contractors	1,540	36,033	38,810	+ 8
Grand Total	$60,000	$200,448	$132,900	- 34

a/ Unable to Calculate

III. Activity Description:

Program Activity	FY 1989	FY 1990	FY 1991
Heavy Water Reactor Confirmatory Development	Initiate confirmatory engineering and technology development activities that support design and safety requirements.	Continue confirmatory engineering and technology development activities that support design and safety requirements.	Continue and partially complete confirmatory engineering and technology development activities that support design and safety requirements.
	$14,540	$34,340	$16,600
Conceptual Design	Prepare solicitations for design contractors and make selections.	Complete and issue conceptual design reports for two HWR designs and for one Heavy Water Processing Facility; establish technical cost and schedule baselines.	Conceptual Design completed in FY 1990.
	Initiate conceptual designs to define technical requirements and design basis for the HWR.		
	$1,300	$21,000	$0

Program Activity	FY 1989	FY 1990	FY 1991
Modular High-Temperature Gas-Cooled Reactor Confirmatory Development	Initiate confirmatory engineering and technology development activities that support design and safety requirements.	Continue confirmatory engineering and technology development activities that support design and safety requirements.	Continue and partially complete confirmatory engineering and technology development activities that support design and safety requirements.
	$7,130	$19,170	$ 9,200
Tritium Target Development	Initiate tritium target development for the MHTGR.	Continue tritium target development for the MHTGR and begin irradiation testing.	Conduct irradiation testing and diagnostic efforts to demonstrate tritium target performance for MHTGR.
	$6,090	$15,850	$26,200
Conceptual Design	Prepare solicitation for design contractor and make selection.	Complete and issue conceptual design reports; establish technical cost and schedule baselines.	Conceptual Design completed in FY 1990.
	Initiate conceptual design to define technical requirements and design basis for the MHTGR.		
	$3,200	$7,250	$0

Program Activity	FY 1989	FY 1990	FY 1991
Light Water Reactor			
Tritium Target Development	Initiate tritium target development.	Continue tritium target development and begin irradiation tests.	Conduct irradiation testing and diagnostic efforts to demonstrate tritium target feasibility.
	$4,400	$24,700	$23,500
Environmental Compliance	Conduct scoping meetings, collect site specific environmental data, and conduct other activities that support development of the Environmental Impact Statement (EIS). Prepare EIS Implementation Plan.	Issue EIS Implementation Plan. Assemble draft EIS and prepare for public hearings on draft EIS.	Issue draft EIS, complete public hearings, resolve public comments and prepare final EIS.
	$10,170	$11,290	$8,300
Safety Review Process	Initiate technical studies and analysis in support of safety review process. Establish requirements for safety review process.	Complete development and begin implementation of safety review processes. Complete development of Levels 1 and 2 safety requirements. Initiate methods and code development in support of conceptual design evaluation.	Continue implementation of the safety review processes. Complete development of safety requirements and reviews of safety issues and documentation resulting from the conceptual design. Coordinate with independent safety oversight groups. Begin evaluation of preliminary design.
	$3,150	$18,540	$16,800

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Program Activity	FY 1989	FY 1990	FY 1991
Program Support	Provide intensive technical overview and management during the development of each technology.	Provide intensive technical overview and management during the development of each technology. Assist in the review of key reactor systems and components. Also, conduct independent review of technical documents, designs and development tasks.	Provide intensive technical overview and management during the development of each technology. Assist in the review of key reactor systems and components. Also, conduct independent review of technical documents, designs and development tasks.
	$8,060	$31,010	$8,000
Program Direction			
Personnel Compensation	Establishment and initial staffing of office to include reimbursement of non-defense funded detailees.	Estimate reflects funding required for salaries and awards for program staff.	Estimate reflects funding required for salaries and awards for program staff.
	19 FTE $1,390	105 FTE $9,800	115 FTE $12,400

Program Activity	FY 1989	FY 1990	FY 1991
Benefits	Employee personnel benefits and additional Federal Employee contributions are expected to accrue. Includes permanent change of station costs.	Employee personnel benefits and additional Federal Employee contributions are expected to accrue. Includes permanent change of station costs.	Employee personnel benefits and additional Federal Employee contributions are expected to accrue. Includes permanent change of station costs.
	$270	$1,495	$1,800
Travel	Includes funds for staff and travel.	Includes funds for staff and travel.	Includes funds for staff and travel.
	$200	$600	$800
Other Services	Provides for contractor support, computer hardware and software programs, acquisition and ADP training. Maintains a minimum work force with Federal/contractor personnel.	Provides for continued contractor support plus covers the transfer of costs from the Office of Computer Services and Telecommunications Management to HP for computer hardware and software acquisition, maintenance, training, Federal/contractor and telecommunications information exchange network support. Maintains a minimum work force with Federal/contractor personnel.	Provides for continued contractor support plus costs for computer hardware and software acquisition, maintenance, training and telecommunications information exchange network support. Maintains an enlarged work force with Federal/contractor personnel.
	$100	$5,400	$10,100

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

NEW PRODUCTION REACTORS

1. Preface: New Production Reactor Program - - Capital Equipment

The FY 1991 Capital Equipment request provides funds for the procurement of test and evaluation, analytic and simulation computer hardware and software in support of all nuclear reactor technologies being developed by the Office of New Production Reactors. Specifically, the equipment acquisitions will facilitate and foster confirmatory development in the areas of seismology, instrumentation and controls, and in-pile and equipment testing.

		FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
II.A.	Summary Table:				
	Capital Equipment	$ 0	$ 0	$ 8,000	a/
	Total, New Production Reactors	$ 0	$ 0	$ 8,000	a/
II.B.	Major Laboratory & Facility Funding b/	$ 0	$ 0	$ 8,000	a/

III. Activity Description:

Program Activity	FY 1989	FY 1990	FY 1991
Capital Equipment	No Activity	No Activity	Procure test and analytic equipment, simulation computers and other items that will support accomplishment of preliminary (Title I) design.
	$ 0	$ 0	$ 8,000

a/ Unable to calculate.

b/ Major Laboratory and Facility Funding will be established during conceptual design when specific confirmatory development requirements and equipment vendors are identified.

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DEPARTMENT OF ENERGY
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ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

NEW PRODUCTION REACTORS

1. Preface: New Production Reactor Program - - Construction

The construction program will provide for the design and construction of new production reactor capacity to produce nuclear materials, primarily tritium, to maintain the Nation's nuclear deterrent. New production reactor capacity will be used to irradiate fabricated fuel and target elements to produce nuclear materials which are recovered from the irradiated elements in processing facilities.

The Department's recommended strategy for providing new production reactor capacity is based on two preferred reactor technologies and sites as follows: (1) a Heavy Water Reactor (HWR) at the Savannah River Site, South Carolina; (2) a Modular High-Temperature Gas-Cooled Reactor (MHTGR) plant at the Idaho National Engineering Laboratory (INEL), Idaho, with supporting facilities to provide fuel and target fabrication, spent fuel processing, and tritium recovery. A final decision on new production reactor capacity technologies and sites will be made after completion of an Environmental Impact Statement. As a contingency, Light Water Reactor (LWR) tritium target development activities will also be pursued.

The HWR is a single low-pressure and low-temperature reactor with fuel and target elements in a heavy water cooled and moderated core. The MHTGR is a high-temperature multi-module reactor plant with helium-cooled, graphite-moderated and graphite-reflected annular cores formed from prismatic fuel and target elements.

		FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
II.A.	Summary Table:				
	Construction	$ 0	$ 98,500	$221,300	+ 125
	Total, New Production Reactors	$ 0	$ 98,500	$221,300	+ 125
II.B.	Major Laboratory and Facility Funding a/	$ 0	$ 98,500	$221,300	+ 125

III. Activity Description:

Program Activity	FY 1989	FY 1990	FY 1991
Construction	No Activity	Initiate preliminary (Title I) design activities for preferred reactor technologies to finalize requirements and criteria.	Continue preliminary (Title I) design and support activities.
	$ 0	$ 98,500	$221,300

a/ Major Laboratory and Facility Funding will be established during conceptual design when specific confirmatory development requirements and equipment vendors are identified.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY

NEW PRODUCTION REACTORS

IV.A. Construction Project Summary

Project No.	Project Title	Total, Prior Yr. Obligations	FY 1990 Appropriated	FY 1991 Request	Unappropriated Balance	TEC
88-D-154	New Production Reactor Capacity	$10,000	998,500	$221,300	TBD	TBD a/
Total, New Production Reactors		$10,000	998,500	$221,300	TBD	TBD a/

IV.B. Plant Funded Construction Project

1. Project title and location: 88-D-154
New Production Reactors
Various Locations

Project TEC: TBD a/
Start Date: b/
Completion Date: b/

2. Financial Schedule b/:

Fiscal Year	Appropriated	Obligations	Costs
1988	$ 10,000	$ 10,000	$ 0
1989	0 c/	0	0
1990	98,500	98,500	78,800
1991	221,300	221,300	177,040
Future Years	TBD	TBD	TBD

a/ The project total estimated cost (TEC) and schedule will be available at the conclusion of the conceptual design. A preliminary cost estimate of $6.8 billion (in 1988 dollars) was developed from the July 1988, New Production Reactor Cost Evaluation (report # DOE/DP-0052) adopted for the preferred combination of technologies and sites.

b/ Schedule dates and financial requirements are preliminary and are based on the current phase of project definition; they will be revised at the conclusion of the conceptual design phase.

c/ $35 million of funds were reprogrammed from capital to operating expense in FY 1989.

3. Narrative:

(a) The construction program will provide for the design and construction of new production reactor capacity to produce nuclear materials, primarily tritium, to maintain the Nation's nuclear deterrent. The Department's recommended strategy for providing this capacity is based on two preferred reactor technologies and sites as follows: (1) a Heavy Water Reactor (HWR) at the Savannah River Site (SRS), South Carolina; (2) a Modular High-Temperature Gas-Cooled Reactor (MHTGR) plant at the Idaho National Engineering Laboratory (INEL), Idaho; and (3) as a contingency, Light Water Reactor (LWR) tritium target development activities will be pursued.

(b) The FY 1990 and 1991 programs fund preliminary designs (Title I) for the HWR and MHTGR as well as design support activities. Also, if it is deemed prudent after completion of conceptual design, DP may initiate a contract for construction management and possible initiation of long lead procurement(a).

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction.	$10,000	$ 0	$ 98,500	$221,300	TBD g/
Capital Equipment	0	0	0	8,800	TBD g/
Operating Expenses.	10,000	60,000	200,448	132,900	TBD g/

g/ The project total estimated cost (TEC) and Schedule will be available at the conclusion of the conceptual design. A preliminary cost estimate of $6.8 Billion (in 1988 dollars) was developed for the July 1988, New Production Reactors Cost Evaluation (report DOE/DP-0052) adopted for the preferred combination of technologies and sites.

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NAVAL REACTORS DEVELOPMENT

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DEPARTMENT OF ENERGY

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ATOMIC ENERGY DEFENSE ACTIVITIES

VOLUME 1

NAVAL REACTORS DEVELOPMENT

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES

OVERVIEW

NAVAL REACTORS DEVELOPMENT

The Naval Nuclear Propulsion Program is carried out jointly by the Departments of Energy and Navy. The Program's objective is twofold: to provide the Navy with militarily effective nuclear propulsion plants and to ensure their continued safe and reliable operation. The Program is responsible for all aspects of nuclear propulsion -- from the design of a plant through operation and eventual disposal. Continuity of responsibility is a hallmark of this Program and is a significant factor in the ongoing success of the nuclear-powered fleet.

Nuclear propulsion plants currently power over 40% of the Navy's combatant vessels. The military presence projected by these ships is significantly greater than the numbers would suggest. Nuclear power obviates the need for refueling at sea, thus allowing nuclear-powered surface ships to spend considerably more time on station than their fossil-fueled counterparts. U.S. submarines' strategic deterrent and tactical combatant roles rise directly from the capabilities afforded by nuclear propulsion. Continued safe support and operation of these vital resources is essential for the Navy to fulfill its National defense roles.

The Soviets are aware of the qualitative advantages our nuclear powered ships enjoy over theirs. In recent years they have taken substantial steps to lessen the advantages. They have devoted tremendous effort to modernizing and improving the military effectiveness of their submarine force, which is quantitatively larger than the U.S. force. Their efforts have resulted in improved submarine classes which are highly capable and represent a significant reduction in the technological gap between their submarines and ours. The Soviets are not resting on their laurels. They continue a vast, aggressive program of nuclear propulsion technology development.

As naval nuclear propulsion technology evolves, performance gains become exponentially harder to achieve. A well-integrated, sophisticated, and far-sighted development program is necessary to ensure the continued superiority of U.S. naval nuclear propulsion. Key thrusts of the Naval Reactors Development budget are operating plant improvement and development of better components and systems for these plants, Advanced Fleet Reactor (AFR) development for the SEAWOLF Class attack submarine under development by the Navy, and advanced nuclear propulsion technology development. These thrusts form a comprehensive, interrelated development program -- work performed in one technical discipline supports and, at the same time, depends on work done in others.

Nuclear propulsion technology development is a lengthy process due to the nature of nuclear energy. Radiation is an inherent aspect of nuclear work, dictating a careful, measured approach to developing nuclear propulsion plants and their constituent components and systems. In this environment, the concern for quality assurance and safety is paramount. Intricate engineering challenges, lengthy time requirements to fabricate the massive and highly complicated components, and extensive testing require many years between initiation of a technology development effort and the introduction of its outcome into the fleet. Careful monitoring and assessment of existing plant operations is also critical to ensuring the continued safe performance of nuclear-powered ships. These evaluations also permit feedback of operational lessons learned into new design efforts.

Top priority is given to ensuring the viability of the operating nuclear powered fleet. These ships collectively represent over a $100 billion investment in today's dollars and are a key element in the Nation's defense. The Soviets have introduced a number of attack submarine classes since the first unit of our latest design, the LOS ANGELES class, went to sea in the mid-1970's. Consequently, installing new state-of-the-art equipment in extant ships is a critical factor in maintaining the potency of the U.S. fleet.

Operating plant improvement involves: monitoring the performance of systems, components, and materials in the fleet; analyzing and evaluating the results; applying lessons learned to development efforts; and backfitting the results of new developments into operating plants. The Program continuously updates reactor plant performance analyses and hones operating parameters to ensure plants are being operated at maximum efficiency. While extensive testing is required for fleet introduction, complete verification is achieved only through lifetime operation in a prototype plant. This can take several decades.

To ensure the long-term viability of the U.S. fleet, the Navy periodically must introduce new designs, like the SEAWOLF (SSN-21) Class attack submarine. The SEAWOLF -- with its Advanced Fleet Reactor -- is intended to maintain our qualitative technological advantage over potential adversaries well into the next century. The AFR will encompass long term developments now coming to fruition and will deliver more power, more quietly, than any previous submarine reactor -- and will do so without a commensurate increase in size or weight. The performance improvements hinge not only on advances in the reactor but in new plant components and systems as well. Improved heat and fluid transfer equipment will increase plant efficiency, thus allowing a higher percentage of total generated reactor power to be used for propulsion. Development of the Advanced Fleet Reactor is proceeding well; all major test components are nearing completion or are undergoing tests, while major components for the lead ship are in fabrication.

Testing and qualification of Advanced Fleet Reactor component and system designs are proceeding. Major components will be assembled to mockup a plant -- testing this mockup will verify that the plant design performs as predicted. Testing will continue over the reactor lifetime to provide early data on performance.

The Advanced Fleet Reactor is based on technology developed through the early-1980's. Long term development efforts continue to expand the Program's technology base and are expected to yield capabilities beyond those of the Advanced Fleet Reactor. The Program is pursuing new structural materials, fuel and poison concepts, plant arrangements, core configurations, manufacturing processes, plant and facility monitoring and control devices, power conversion techniques, and heat exchange methods. Features sought are enhanced power, longer life, decreased weight, increased structural integrity and resilience, reduced corrosion, and improved safety and ease of operation.

Efforts in basic technologies such as materials behavior, thermal hydraulics, manufacturing and chemical processes, noise attenuation, nuclear physics, and design analysis methods provide the base for future nuclear propulsion plant component and system development. They drive the evolution of component and system designs, and define what can be achieved in a propulsion plant. These efforts are also instrumental to verifying and enhancing existing designs, establishing operating parameters for new designs, and ensuring continued safe plant and facility operation.

Through thoughtful development efforts, the Program has been able to maintain a qualitative advantage in naval nuclear propulsion over all potential adversaries. This advantage has been maintained in the face of increasing requirements to support a larger nuclear-powered fleet whose average ship age has tripled in the last fifteen years. The success of the Program is perhaps best measured by the performance of the product: nuclear powered ships have steamed over 78 million miles, representing over 3,500 reactor years of operation, and have done so without a single accident.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(Dollars in thousands)
LEAD TABLE

NAVAL REACTORS DEVELOPMENT

	FY 1989	FY 1990[1/]	FY 1991 Request	Program Change Req. vs. Base Dollar	Program Change Req. vs. Base Percent
Operating Expenses:					
Reactor Development	$ 236,700	$ 241,621	$ 258,900	+17,279	+ 7%
Plant Development	83,000	85,695	89,300	+ 3,605	+ 4%
Reactor Operation and Evaluation	222,700	213,745	207,000	- 6,745	- 3%
Program Direction	13,000	13,298	14,000	+ 702	+ 5%
Capital Equipment	48,000	53,190	55,400	+ 2,210	+ 4%
Construction	26,600	34,674	27,400	- 7,274	- 21%
TOTAL:					
Operating Expenses	$ 555,400	$ 554,359	$ 569,200	+14,841	+ 3%
Capital Equipment	48,000	53,190	55,400	+ 2,210	+ 4%
Construction	26,600	34,674	27,400	- 7,274	- 21%
TOTAL Naval Reactors Development	$ 630,000	$ 642,223	$ 652,000	+ 9,777	+ 2%
Staffing TOTAL FTE's	200	215	215		

Authorization Section 31, P.L. 83-703

1/ Dollar amounts for FY 1990 and the FY 1991 Base are the same. FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustment.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(Dollars in Thousands)
SUMMARY OF CHANGES
NAVAL REACTORS DEVELOPMENT

FY 1990 Appropriation	$ 642,223
FY 1991 Base	$ 642,223
Reactor Development Increase due to expanded materials testing, expanded performance analysis to ensure continued safe operation of aging plants, conversion of computer codes to next generation computers, development of manufacturing processes, and escalation	+ 17,279
Plant Development Increase due to escalation	+ 3,605
Reactor Operation and Evaluation Decrease reflects a lower level of prototype servicing effort	- 6,745
Program Direction Increase due to escalation and staffing cost increase	+ 702
Capital Equipment Increase due to escalation	+ 2,210
Construction Decrease due primarily to lower funding requirements for continuing projects	- 7,274
FY 1991 Congressional Request	$ 652,000

26-657 O—90—11

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(Dollars in thousands)
KEY ACTIVITIES SUMMARY

NAVAL REACTORS DEVELOPMENT

I. Preface: Reactor Development

Reactor Development aims at improving the performance of naval reactors with the preeminent goal being the assurance of safe operation for all the Program's reactors. Improving reactor performance requires continuing the evolution of reactor design. The demands placed upon the Navy's nuclear-powered ships, especially the nuclear submarine fleet, will continue to increase as potential adversaries resolutely continue their nuclear propulsion programs. Recognition must be given to the greater technological effort required to achieve each new advance.

Achieving higher powered, more capable naval reactors requires the development of advanced fuel, poison, cladding and other core materials. Reactor Development work involves seeking and developing reactor and core materials which maintain their structural and dimensional integrity over long periods of time in the harsh reactor environment, as well as exhibit desirable nuclear properties. Research and development in reactor physics, nuclear design and analysis and testing of operating core physics aims at establishing desired nuclear characteristics in future cores and confirming them in existing cores. Improved material, component, and system manufacturing processes and fabrication techniques are sought to reduce costs, provide options, and allow more accurate prediction and determination of reactor operating characteristics. Development of sophisticated analytic and modelling techniques, substantiated through experimentation and testing, provide the nuclear and reactor designers powerful tools to optimize the blending of advances in these and other technology areas to achieve superior reactor performance. Manufacturing and design concepts are factored into developmental cores for proof-of-concept demonstration and subsequently lifetime testing under operational conditions. After a lifetime of prototypic testing the expended cores are examined and their performance evaluated thus providing valuable feedback to the various development efforts.

Reactor Development work involves five areas: Core Examination; Materials Development; Nuclear Design and Analysis; Reactor Technology; and Reactor Process Development.

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Core Examination work includes the examination of expended shipboard and prototype cores and irradiated test specimens from the Advanced Test Reactor. The information provides comparisons between predicted and actual core material behavior thus providing feedback and direction to ongoing material development work.

Materials Development work involves developing and qualifying high integrity nuclear fuel, poison, cladding and structural materials suitable for application in advanced naval reactor cores and viable for manufacture. Materials development work focuses on developing materials capable of maintaining their structural and mechanical integrity over long periods of time in a harsh operating reactor environment as well as providing design options due to improved physical or nuclear characteristics. An integral part of this effort is the parallel development of manufacturing processes to ensure materials can be economically produced to stringent specifications in large quantities.

Materials and material test specimens are fabricated, using prototypic manufacturing processes, and rigorously tested for desired characteristics. Irradiation testing conducted in the Advanced Test Reactor is a key to this confirmation process. Materials exhibiting the desired characteristics are committed to long-term tests in prototype cores and associated components. Likewise, materials committed to fleet use are subjected to long-term testing and evaluation. Work in FY 1991 will be a continuation of FY 1990 efforts adjusted for inflation and evaluations of materials required to support potential alternate reactor design concepts.

Nuclear Design and Analysis work involves reactor physics development and nuclear design of advanced reactor cores. This work aims at designing nuclear cores which take advantage of the advances in nuclear physics, materials and manufacturing capabilities, assuring efficient use of fuel, and minimizing adverse material conditions in the reactor. Physics effort involves experimentation, testing of operating plants and physics design, analysis and modelling development. Work in this category also includes analysis and design work aimed at ensuring safe operation of the reactor plants and fuel handling solutions. Safety and performance analyses are conducted to ensure reactor plants are operated safely while reactor plant shielding design and evaluation work aims at developing more effective shield designs while minimizing shielding weight and size. In addition, controls are developed and implemented for the safe handling, storage, processing and safeguarding of fissile material. FY 1991 funding requirements reflect escalation, expanded safety and performance analysis efforts, and computer code conversion to next generation computers.

Reactor Technology focuses on how to improve reactor components and systems. The design effort seeks to optimize the performance of all reactor components on an individual basis as well as in an overall system. These components include the core, support structures, pressure vessel and boundary area, closure head, core barrel assembly and control rod drive mechanisms. Testing and analysis in the areas of thermal hydraulics, structural mechanics, corrosion, fatigue, shock, and vibration are essential to understanding the trade-offs made between design choices. Computer modelling and analysis programs are indispensable to developing this understanding. Promising component designs are fabricated and tested individually, in integrated test assemblies, and as necessary, prototypically in a land-based prototype.

Reactor Process Development involves improving manufacturing and assembly processes and techniques and the fabrication of prototype cores and core components. Better manufacturing techniques and quality control techniques are often necessary to realize the performance gains promised by advanced designs and also contribute by reducing uncertainty in the quality and physical characteristics of reactor materials and systems. No less important is the improvement in manufacturing efficiency to reduce production costs. Involvement of vendors in process development is key to ensuring that the processes developed in the laboratory are correctly implemented. Fuel modules and associated components are assembled into developmental cores. Increase in FY 1991 reflects escalation and development of manufacturing processes to support advanced material and reactor designs.

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II. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	$ Change
Core Examination	$ 22,000	$ 22,700	$ 23,000	+ 1%
Materials Development	66,000	71,821	79,000	+ 10%
Nuclear Design & Analysis	34,000	35,500	38,700	+ 9%
Reactor Technology	53,700	50,500	50,900	+ 1%
Reactor Process Development	61,000	61,100	67,300	+ 10%
Total Reactor Development	$ 236,700	$ 241,621	$ 258,900	+ 7%

II. B. Major Laboratory and Facility Funding

Bettis Atomic Power Laboratory	$ 137,800	$ 124,321	$ 129,200	+ 4%
Knolls Atomic Power Laboratory	59,000	72,100	83,800	+ 16%
Idaho National Engineering Laboratory	39,900	45,200	45,900	+ 2%

III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
Core Examination	Examine irradiation tests of fuel, clad, control rod and structural materials and prepare irradiation test trains for testing. The material performance data obtained from these tests is used to determine and verify performance of materials for reactor components and cores;	Continue irradiation test train assembly and disassembly and conduct post-irradiation examination of experiments to support material development efforts;	Continue to support irradiation testing efforts, including test train assembly and disassembly, and post irradiation examinations;
	Examine expended cores to determine fuel and structural component operational performance; receive MARF prototype core;	Continue expended core exams to determine fuel and structural component performance; examine MARF prototype core and receive SIW prototype core;	Continue expended core exams, including MARF and SIW, and receive SBG prototype core;
	Process expended prototype cores for disposal, including the SSG prototype core;	Continue to process expended prototype cores for disposal, including the MARF prototype core;	Continue to process expended prototype cores for disposal including the SIW prototype core;
	Maintain core examination facilities.	Continue to maintain core examination facilities.	Continue to maintain core examination facilities.
	($22,000)	($22,700)	($23,000)

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Program Activity	FY 1989	FY 1990	FY 1991
Materials Development	Conduct irradiation testing at the Advanced Test Reactor (ATR) to develop and qualify materials for application in naval nuclear propulsion plants;	Continue irradiation testing in ATR, including in-pile corrosion testing;	Continue irradiation testing in ATR;
	Fund operation and maintenance of ATR including procurement of driver fuel elements for ATR;	Continue to operate and maintain ATR;	Continue to operate and maintain ATR and begin procuring ATR reactor components to support FY 1992 cc e internal change out;
	Conduct an expanded ATR reactor review, analysis and assurance effort to ensure continued safe and efficient operation of ATR;	Continue expanded ATR reactor analysis;	Continue expanded ATR reactor analysis;

Program Activity	FY 1989	FY 1990	FY 1991
	Develop, optimize and qualify manufacturing processes for existing and candidate reactor and core materials. The goal is to improve mechanical and physical properties as well as fabricability;	Continue to develop and improve reactor and core materials through manufacturing development;	Material manufacturing development will continue including testing of materials being developed to support alternate fuel element manufacturing processes;
	Formulate and qualify material and fuel system analytical techniques, design models and procedures. These analytical methods are used to evaluate performance of present designs as well as predict the performance of advanced designs. Convert computer codes as necessary;	Continue to develop, qualify and use analytical methods, and convert computer codes as necessary;	Continue development, use and qualification of analytical methods; continue to convert codes as necessary;

Program Activity	FY 1989	FY 1990	FY 1991
	Develop, test, evaluate and characterize advanced core materials and material systems; work includes fabrication of material specimens to test the effect of alternate chemical composition and manufacturing processes on in-reactor corrosion resistance, mechanical property testing, hydrogen content analyses, and metallurgical examinations;	Continue development,testing, evaluation and characterization of advanced and existing core materials and material systems;	Continue development,testing, evaluation and characterization of advanced and existing core material and material systems;
	Conduct thermal and mechanical property tests and corrosion tests of existing and candidate reactor and structural materials to establish corrosion, wear, electrochemical, fatigue, and stress corrosion cracking characteristics;	Continue development and testing of existing and candidate reactor and structural materials including continued long-term low temperature embrittlement exposures and tests of reactor pressure vessels;	Continue reactor and structural material development and testing including evaluation of new materials;
	Perform quality engineering functions related to manufacturing and testing programs;	Continue to perform quality engineering functions;	Continue to perform quality engineering functions.

Program Activity	FY 1989	FY 1990	FY 1991
	Maintain and operate material testing and examination facilities.	Continue to maintain and operate material testing and examination facilities.	Continue to maintain and operate material testing and examination facilities.
	($66,000)	($71,821)	($79,000)

Program Activity	FY 1989	FY 1990	FY 1991
Nuclear Design and Analysis	Monitor prototype core performance and conduct periodic physics testing and analyses to ensure core operation is maintained within approved design criteria, confirm adequacy of nuclear design parameters, verify design methods, and identify improvements to nuclear design models to eliminate biases;	Continue to monitor prototype core performance and conduct periodic physics testing and analyses including conducting beginning-of-life acceptance testing and evaluation of Developmental Materials Core (DMC) in MARF and completing analysis of data from S1W End-of-Life Test Program;	Continue to monitor prototype core performance and conduct periodic physics testing and analyses including S3G physics calculations for core behavior, power distribution, and control rod worth through end-of-life;
	Extend DMC Reactor System Performance Analysis (RSPA) including development of core follow nuclear design model to provide physics basis for performing RSPAs throughout core life;	Continue DMC RSPA extension;	Complete core follow nuclear design model for DMC and continue physics analysis for RSPA;
	Continue AFR nuclear design, testing and analysis work including:	Continue AFR nuclear design, testing and analysis work including:	Continue AFR nuclear design, testing and analysis work including:
	o Modelling of AFR reactor plant nuclear performance;	o Preparing for test of AFR reactor plant electrical systems equipment with AFR reactor plant computer model;	o Test AFR reactor plant electrical systems microprocessor equipment with AFR reactor plant nuclear model;
	o Shield design modification to accommodate AFR core;	o Shield design modifications to accommodate AFR core;	---

Program Activity	FY 1989	FY 1990	FY 1991
	o Provide physics input for the AFR prototype core RSPA;	o Complete physics analyses for the AFR prototype core installed and continue RSPA;	o Issue AFR core SAR and continue physics support of RSPA;
	Develop, optimize and improve nuclear design, analysis, modelling and emulation techniques, including converting computer codes to replacement computers, and demonstrating emulation techniques;	Continue nuclear design, analysis and methods development including converting computer codes to replacement computers and develop means to minimize future conversion costs;	Continue nuclear design, analysis and methods development, including development of new design capabilities for Monte Carlo calculation and a three-dimensional space-time kinetics capability; continue computer code conversion to next generation computer;
	Conduct physics experimentation and testing including advanced core design experiments and neutron cross section measurement of current and advanced core materials;	Continue physics experimentation and testing including experiments involving advanced core designs, and neutron cross section measurements of advanced core materials;	Continue physics experimentation;
	Perform criticality analyses for handling, storage, and shipping of nuclear material;	Continue criticality analyses for handling, storage, and shipping of nuclear material;	Continue criticality analyses for handling, storage, and shipping of nuclear material;

Program Activity	FY 1989	FY 1990	FY 1991
	Provide radiation level evaluations and shield design support for prototype and refueling/defueling equipment operation and modification and perform advanced concept shield design analyses;	Continue to provide shield design support and advanced shield design concepts including evaluation of shielding requirements for candidate advanced core design;	Continue shield design support and advanced shield design including shielding analyses for fuel handling operations, and shielding requirement scoping studies for proposed reactor designs;
	Evaluate physics characteristics of advanced nuclear core designs incorporating new fuel and poison materials and processes and alternate reactor concepts; perform studies to determine protection systems and operating principles required by new designs;	Continue advanced nuclear core design including development of physics procedures necessary to analyze alternate reactor concepts;	Continue advanced nuclear core design work, physics analysis of alternate reactor concepts, and evaluate advanced protection systems needed to support new core designs.
	($34,000)	($35,500)	($38,700)

Program Activity	FY 1989	FY 1990	FY 1991
Reactor Technology	Continue Advanced Fleet Reactor (AFR) design, testing, analysis, validation, and component fabrication work, including:	Continue AFR work including:	Continue AFR work including:
	o Thermal hydraulic and mechanical tests and analysis of the AFR design;	o Thermal hydraulic and mechanical tests and analysis of AFR design, including work on a multiple channel thermal test;	o Continue to perform AFR design testing and analysis;
	---	o Perform noise and functional testing of AFR reactor assembly;	o Continue noise and functional testing of AFR reactor assembly;
	o Continued design, fabrication, and certification of AFR reactor components; deliver AFR prototype reactor closure and core barrel assembly;	o Assemble prototype power unit at core vendor;	---

Program Activity	FY 1989	FY 1990	FY 1991
	o Complete fabrication, life test, and structural analysis of AFR prototype control drive mechanisms and assemble in power unit;	---	---
	Conduct thermal, hydraulic, mechanical and fuel system analyses to support Reactor System Performance Analyses (RSPA), including extension of DMC RSPA to end-of-life;	Conduct thermal, hydraulic, mechanical, and fuel system analyses in support of RSPAs;	Continue technical support of RSPAs and safety analyses;
	Conduct research and testing in such areas as thermal hydraulics, noise transmission, fluid, and structural mechanics to improve design analysis methods, modelling,and procedures;	Continue fuel and structural mechanic, thermal hydraulic, and noise transmission testing and design tool development including multiple channel testing to further qualify design procedures and development of improved methods to solve multi-dimensional fluid flow problems;	Continue research and development in these technical disciplines including development of time-dependent fluid-solid interaction analyses used in shock evaluations; continue steady flow, critical heat flux flow oscillation tests to develop advanced models;
	Test and evaluate advanced concepts for reactor systems and reactor component design including alternate control drive mechanisms and noise transmission management techniques;	Continue testing and evaluation of alternate reactor and reactor plant concepts, including plant optimization studies, thermal hydraulic analysis of heat transfer components;	Continue design and development of advanced plant concepts;

Program Activity	FY 1989	FY 1990	FY 1991
	Continue conversion and upgrades of computer codes including multi-processor programming;	Continue conversion of computer codes;	Continue conversion of computer codes.
	Maintain and upgrade testing facilities.	Continue to maintain and upgrade testing facilities.	Continue to maintain and upgrade testing facilities;
	($53,700)	($50,500)	($50,900)

Program Activity	FY 1989	FY 1990	FY 1991
Reactor Process Development	Complete Developmental Materials Core (DMC);	---	---
	Continue AFR prototype core manufacture;	Complete AFR prototype core;	---
	Continue Modified Fuel Process (MFP) manufacturing technology development with goals to improve quality and reduce costs; transferability of process will be proven at core vendor;	Continue MFP manufacturing technology development including technology transfer and second core vendor qualification;	Continue development of MFP manufacturing technology and qualification of core vendor, including full-scale production runs;
	Develop manufacturing processes needed to support advanced core and reactor system designs and improve existing processes to reduce costs and enhance quality;	Continue manufacturing development to support existing reactor designs and determine manufacturability of proposed designs including improvements in fuel and poison starting material techniques;	To meet needs of current and future reactor designs, manufacturing development will continue;
	Develop quality inspection techniques and processes to ensure stringent Naval Reactors component and design specifications are met; provide laboratory technical assistance to vendors to ensure processes are understood;	Continue to develop improved quality inspection techniques including improved weld probe and fiber-optic techniques; continue technical support to vendors;	Continue inspection technique development and technical support of vendors, including development of new nondestructive test methods and real-time fiber-optic inspection analysis;

Program Activity	FY 1989	FY 1990	FY 1991
	Facilitate manufacturing development through fabrication of test specimens in pilot scale production facilities in-house and at vendors;	Continue test specimen manufacture and proof of principle fabrication efforts;	Continue fabrication of test elements, specimens and components to support process development and provide specimens for irradiation and non-irradiation testing;
	Evaluate high performance core designs in terms of manufacturability.	Continue evaluation of fabricability of high performance core designs.	Continue manufacturing development efforts to support advanced core concepts.
	($61,000)	($61,100)	($67,300)
TOTAL REACTOR DEVELOPMENT	$236,700	$241,621	$258,900

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(Dollars in thousands)
KEY ACTIVITIES SUMMARY

NAVAL REACTORS DEVELOPMENT

1. Preface: Plant Development

Plant Development focuses on improving the performance of the entire reactor plant by integrating new technologies into developmental systems and components. Advanced reactors alone cannot provide the enhanced performance needed in next-generation nuclear-powered ships -- greater power, reduced noise, reduced plant weights, and longer life require a composite effort to improve all aspects of a reactor plant. Component development efforts seek to ameliorate individual component performance; plant arrangement studies seek to reduce weight and enhance efficiency while optimizing space usage; and generic chemistry and materials technology work supports existing and advanced plant concepts. New features are proven in laboratory tests and verified under typical operating conditions at the prototype plants. Backfitting improved components and systems can also add to the performance and operational effectiveness of extant plants.

Plant Development has two subcategories: Materials, Chemistry, and Supporting Development, and Plant Technology.

Materials, Chemistry and Supporting Development work includes developing technology to operate and monitor plants and facilities, verify the performance characteristics of operating plants and improve the performance of future plants. Materials development efforts include investigating corrosion, fatigue and structural characteristics in operating environments, and applying results to material verification, qualification and development. Chemistry efforts include examining coolant corrosion tendencies and developing new water chemistries and primary plant cleaning techniques. Quality control activities, facility monitoring and decontamination ensure continued safe working environments and allow extensive facility reuse. Much of Materials, Chemistry and Supporting Development is of an ongoing nature. FY 1991 funding requirements reflect continuation of FY 1990 level of effort.

Plant Technology work focuses on verifying operating characteristics of existing plants, developing plants with enhanced capabilities, and integrating improved plant components in plants to maximize overall efficiency and performance. Development, testing, and evaluation of new plant arrangements and configurations using improved heat transfer, fluid transfer, and power conversion components will provide smaller, quieter, and more powerful plants for future naval vessels. Developmental plants will use state-of-the-art instrumentation and control equipment to provide operators with the highest levels of control and monitoring ability. All new features are tested in operating environments to confirm performance improvements and fleet applicability. FY 1991 requirements reflect FY 1990 requirements adjusted for inflation.

11. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	$ Change
Materials, Chemistry and Supporting Development	$ 29,000	$ 27,600	$ 28,000	+ 1%
Plant Technology	$ 54,000	$ 58,095	$ 61,300	+ 6%
Total Plant Development	$ 83,000	$ 85,695	$ 89,300	+ 4%

11. B. Major Laboratory and Facility Funding

Bettis Atomic Power Laboratory	$ 45,800	$48,895	$55,900	+ 14%
Knolls Atomic Power Laboratory	37,200	36,800	33,400	- 9%

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III. Activity Descriptions	FY 1989	FY 1990	FY 1991
Program Activity			
Materials, Chemistry and Supporting Development	Develop, test, and qualify new coolant chemistries;	Continue development efforts on new coolant chemistries; perform boiling simulator qualification tests;	Continue investigating and developing new water chemistries;
	Develop and test improved chemical cleaning methods for steam generators; test new cleaning processes in the Advanced Test Reactor to demonstrate that they are benign to plant material;	Continue development and testing of improved cleaning processes; support MARF prototype chemical cleaning and prepare for SBG prototype chemical cleaning;	Continue development of new cleaning processes; support SBG prototype chemical cleaning;
	Develop and test new plant materials complete testing of X-750 bolts; initiate tests to qualify alternate fastener material (Alloy 625);	Continue development and testing of new plant materials; perform testing of Alloy 600 steam generator tubing;	Continue development and testing of new plant materials; initiate qualification of advanced high-strength, low-alloy steel;
	Develop and test plant decontamination processes to reduce radiation exposure during plant maintenance;	Continue to develop and test decontamination processes;	Continue to develop and test decontamination processes; define effort to develop mathematical model of coolant purification system;

Program Activity	FY 1989	FY 1990	FY 1991
	Perform quality assurance inspection, testing, and training required within laboratories and at prototype sites;	Continue quality assurance inspection and testing;	Continue quality assurance inspection and testing;
	Maintain radiation monitoring, control and compliance programs;	Continue radiation monitoring, control and compliance programs;	Continue radiation monitoring, control, and compliance programs;
	Carry out facility clean up program and waste control efforts.	Continue facility clean up and waste control efforts.	Continue facility clean up and waste control programs.
	($29,000)	($27,600)	($28,000)

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Program Activity	FY 1989	FY 1990	FY 1991
Plant Technology	Develop instrumentation and control equipment for advanced plant applications and fleet and prototype backfit efforts;	Continue development of instrumentation and control equipment; begin interactive studies with plant operating personnel;	Continue development of instrumentation and control equipment; initiate mockup of systems which have potential benefits to future plants;
	Develop and fabricate instrumentation and control equipment to support MARF prototype servicing;	Continue to develop and fabricate instrumentation and control equipment for MARF prototype servicing; develop and fabricate equipment for SBG prototype servicing;	Continue to develop and fabricate instrumentation and control equipment for SBG prototype servicing;
	Develop new digital, microprocessor and graphic display technologies for application to reactor plant control and monitoring;	Continue developing new electric and electronic technologies, including pressurizer level indicators;	Continue investigating new electronic monitoring techniques; test high current AC static breakers;
	---	Develop new static electronic power conversion technology and equipment for advanced plant applications;	Continue developing advanced power conversion equipment;
	Evaluate new steam generator concepts and conduct small-scale testing of advanced heat transfer components;	Continue evaluating and testing new steam generator concepts;	Continue evaluating new steam generator concepts; complete thermal-hydraulic tests of small-scale test units;
	Prepare for fabrication of large-scale steam generator test devices;	Commence fabrication and evaluation of large-scale advanced steam generator test devices;	Continue fabrication and commence qualification of large-scale advanced steam generator test devices;

Program Activity	FY 1989	FY 1990	FY 1991
	Test, evaluate and fabricate heat and fluid transfer equipment;	Continue testing and evaluating auxiliary equipment, including Boiling Simulator testing of operating heat transfer equipment;	Continue testing and evaluating auxiliary equipment, including flow and mechanical testing of advanced technology design assemblies and components;
	Conduct fluid flow and plant arrangement studies; refine computer codes for weight and plant performance;	Continue fluid flow and plant arrangement studies; determine the best concept for detailed development;	Continue fluid flow and plant arrangement studies; continue conceptual design of new plant concept;
	Monitor and evaluate steam generator component performance;	Continue to monitor and evaluate steam generator performance and develop new monitoring and analysis techniques;	Continue to monitor steam generator performance and qualify new monitoring and analysis methods;
	Complete development of plant emulation techniques.	---	---
	($54,000)	($58,095)	($61,300)
TOTAL PLANT DEVELOPMENT	$83,000	$85,695	$89,300

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(Dollars in thousands)
KEY ACTIVITIES SUMMARY

NAVAL REACTORS DEVELOPMENT

I. Preface: Reactor Operation and Evaluation

Reactor Operation and Evaluation provides for the operating and servicing of eight land-based prototype naval nuclear propulsion plants. These prototypes allow analysis of cores, new component designs, and materials in an actual operating plant for acceptability and problem resolution before introduction to fleet units, thus avoiding interference in operating ships' activities. These prototypes are also training platforms for Navy personnel training to be reactor plant operators. The decreases in this category are due to the winding down of the MARF prototype refueling and overhaul and S1W defueling and inactivation.

Reactor Operation and Evaluation is broken down into three categories: Reactor Servicing and Refueling; Reactor Engineering and Analysis; and Reactor Operation and Testing.

Reactor Servicing and Refueling provides for prototype plant reliability and efficiency through prototype engineering, overhauls, availabilities, and refuelings. This effort involves design support of refueling equipment and planning and engineering support for prototype servicings. The decreases in FY 1991 reflect the winding down of major servicings of the MARF and S1W prototypes.

Reactor Engineering and Analysis covers evaluation and analysis of reactor design, thermal and hydraulic performance, and stress and vibration effects to establish operating limits and support hardware redesign. This category also includes establishing the thermal performance capability of the Advanced Fleet Reactor core to ensure acceptability.

Reactor Operation and Testing covers routine operation and maintenance of prototype reactor plants to provide technical information through testing and examination of materials and components associated with plant operating systems, and to support training of Naval nuclear plant operators. As the prototype plants age (they average over 25 years old), they require a higher level of preventive and routine maintenance.

II. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	$ Change
Reactor Servicing & Refueling	$ 149,700	$ 135,900	$ 130,000	- 4%
Reactor Engineering & Analysis	9,000	8,745	8,000	- 8%
Reactor Operation & Testing	64,000	69,100	69,000	--
Total Reactor Operation and Evaluation	$ 222,700	$ 213,745	$ 207,000	- 3%

II. B. Major Laboratory and Facility Funding

Bettis Atomic Power Laboratory	$ 61,300	$ 61,745	$ 57,300	- 7%
Knolls Atomic Power Laboratory	161,400	152,000	149,700	- 2%

III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
Reactor Servicing and Refueling	Continue NARF prototype overhaul, instrumentation and control equipment changeout effort and NARF refueling operation;	Continue NARF prototype refueling and overhaul, including final acceptance testing;	Complete NARF refueling overhaul including equipment and facility disposition;
	Complete S1W prototype defueling and inactivation preparations, including initiation of site contractor mobilization;	Initiate S1W prototype defueling and inactivation;	Complete S1W prototype defueling and inactivation, including final inactivation reporting and major recoverable items disposition;
	Complete the A1W prototype overhaul;	---	--

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Program Activity	FY 1989	FY 1990	FY 1991
	Continue preparations for the S8G prototype refueling, overhaul, and instrumentation and control work; begin servicing facility construction support;	Continue preparations for S8G refueling and overhaul including performance of pre-overhaul testing and inspections;	Complete preparations and start S8G prototype refueling and overhaul;
	---	Commence planning for the S3G prototype inactivation;	Initiate preparations for the S3G prototype inactivation;
	Develop and install safety systems at the D1G prototype; continue upgrades at other prototype plants; provide design support for essential systems;	Complete testing of new safety systems at the D1G prototype and continue upgrades and design support at other prototypes;	Continue safety system upgrades and design support at various prototype plants;
	Complete D1G steam generator cleaning and continue planning for steam generator inspections and cleanings at other prototype plants;	Continue planning for prototype steam generator inspections and cleanings;	Perform steam generator inspections and cleanings of A1N and S5G prototype plants;
	Complete D1G selected restricted availability and continue preparations for other servicings, including plant design analyses and engineering support;	Continue preparations for prototype servicings, including refueling equipment design and procurement, plant design analyses and engineering support;	Continue preparations for various prototype availabilities and servicings, including plant desing analyses and engineering support;
	Ensure compliance with environmental statutes; continue PCB disposal program	Continue environmental and PCB programs.	Continue environmental and PCB programs.
	($149,700)	($135,900)	($130,000)

Program Activity	FY 1989	FY 1990	FY 1991
Reactor Engineering and Analysis	Continue work on the Advanced Fleet Reactor (AFR) reactor system performance analysis to ensure satisfactory core performance and initiate work on the AFR safety analysis report and acceptance test report;	Continue work on the AFR reactor system performance analysis; continue the AFR safety analysis report and acceptance test program;	Continue work on the AFR reactor system performance analysis, shifting emphasis to middle of core life; complete the AFR safety analysis report and acceptance test program;
	Conduct thermal and hydraulic analyses of various prototype plants to ensure core thermal design limits are not exceeded;	Continue thermal and hydraulic analyses on various prototype plants;	Continue thermal and hydraulic analyses on various prototype plants;
	Provide design support for prototype reactor components and ensure reactor equipment meets design criteria;	Continue component design support and ensure design criteria are met; complete analysis of AFR reactor equipment;	Continue component design support and ensure design criteria are met; evaluate effect of design changes;
	Support expanded prototype reactor core examinations; resolve operating problems of prototype reactors and emergent hardware concerns;	Continue expanded core examination support and resolve prototype reactor operating problems and emergent hardware concerns;	Continue expanded core examination support; resolve prototype reactor operating problems and emergent hardware concerns;
	Conduct stress and vibration analyses required to establish prototype plant operating parameters and to ensure satisfactory mechanical performance of reactor components; implement vessel ultrasonic test inspection plan.	Continue stress and vibration analyses on selected prototype plants to establish operating parameters. Continue ultrasonic test equipment fabrication.	Continue stress and vibration analyses on selected prototypes; perform ultrasonic test inspection on SBG prototype and report results.
	($9,000)	($8,745)	($8,000)

Program Activity	FY 1989	FY 1990	FY 1991
Reactor Operation and Testing	Continue safe and reliable operation and maintenance of the prototype plants, including maintenance shutdowns to perform preventive maintenance; continue maintenance and upkeep of prototype support facilities to meet programmatic needs; assist prototype plant servicings;	Continue prototype plant operation and maintenance; continue upkeep of prototype support facilities;	Continue prototype plant operation and increase maintenance efforts to reflect increasing age of plants;
	Continue in-house personnel operator training to provide for prototype operation and maintenance; support development and create test procedures for reactor plant emulation concepts to aid in operator training;	Continue in-house reactor plant operator training and qualification; identify changes and develop new programs to improve training; prepare revisions to prototype plant manuals and evaluate change requests;	Continue in-house reactor plant operator training and qualification; incorporate changes into reactor plant manuals and training curricula;
	Maintain spare equipment inventories; conduct required programming and testing of the Automated Inventory Management System prior to full implementation at the prototype plants;	Complete full implementation of the Automated Inventory Management System; procure additional spare equipment to meet required inventory levels under the new system;	Expand the Automated Inventory Management System by developing material requirements planning capability;

Program Activity	FY 1989	FY 1990	FY 1991
	Ensure compliance with radiological and hazardous effluent and environmental regulations concerning prototype site activities; monitor personnel radiation exposure levels to ensure high safety standards are met.	Continue monitoring prototype site radiological and environmental regulations compliance and personnel radiation exposure levels to ensure high safety standards are met.	Continue monitoring radiological and environmental regulations compliance and personnel radiation exposure levels; provide technical support and coordination for the removal and disposal of irradiated and contaminated components and waste from prototype servicings, including effort necessary to provide for inactivation of the SIW prototype;
	($64,000)	($69,100)	($69,000)
TOTAL REACTOR OPERATION AND EVALUATION	$222,700	$213,745	$207,000

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTVITIES
(Dollars in thousands)

KEY ACTIVITIES SUMMARY

NAVAL REACTORS DEVELOPMENT

I. Preface: Program Direction

Naval Reactors operates under constrained manpower levels. Program Direction funds provide salaries, benefits, travel, and other expenses for 215 full time Federal employees at the Naval Reactors, Pittsburgh Naval Reactors, and Schenectady Naval Reactors Offices to support the Naval Reactors Development Program. Naval Reactors personnel are responsible for all aspects of naval nuclear propulsion, including operation of the reactor plants powering 40% of the Navy's combatants, and testing, inspecting, and qualifying plants and personnel to ensure the high standards of the Program are maintained. Naval Reactors is a centrally managed organization, thus placing a heavy burden on the Federal employees who must oversee and set policies and procedures affecting numerous organizations -- including shipyards, operating ships, contractors, the Bettis and Knolls Atomic Power Laboratories and associated facilities -- and deal with numerous day-to-day issues involving these activities.

Program Activity	FY 1989	FY 1990	FY 1991
Program Direction	Continue to support ongoing Naval Reactors Development work; Continue management and technical oversight of the Knolls and Bettis Atomic Power Laboratories and associated facilities; Continue to ensure the safe and reliable operation of naval nuclear reactor plants.	Continue to support ongoing Naval Reactors Development work; Continue management and technical oversight of the Knolls and Bettis Atomic Power Laboratories and associated facilities; Continue to ensure the safe and reliable operation of naval nuclear reactor plants.	Continue to support ongoing Naval Reactors Development work; Continue management and technical oversight of the Knolls and Bettis Atomic Power Laboratories and associated facilities; Continue to ensure the safe and reliable operation of naval nuclear reactor plants.
TOTAL PROGRAM DIRECTION	$13,000	$13,298	$14,000

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(Dollars in thousands)
KEY ACTIVITIES SUMMARY

NAVAL REACTORS DEVELOPMENT

I. Preface: Capital Equipment

Capital equipment requirements reflect the Program's effort to maintain, upgrade and ensure safe and efficient operation of laboratory facilities, including two research and development laboratories, eight land-based prototype nuclear propulsion plants, the Advanced Test Reactor and the Expanded Core Facility. In addition, these requirements reflect the Program's effort to ensure adequate resources are available to conduct the testing and development efforts essential to accomplishment of Program objectives.

Program Activity	FY 1989	FY 1990	FY 1991
Capital Equipment -- Major Items of Equipment	FY 1989 requirements include continuation of Advanced Test Reactor and prototype plant component replacement, modifications and upgrades. Laboratory computing equipment will be upgraded to expand the capacity of the CDC 7600 replacement computers to accommodate expected growth in usage. Requirements include	Includes continuation of Advanced Test Reactor loop replacement effort; prototype plant safety enhancement upgrades; procurement of long lead material for shipping cask equipment. Computer resource upgrading program will continue with expansion of the laboratories' scientific computers primary	Continuation of the Advanced Test Reactor loop replacement effort and prototype plant safety enhancement upgrades; delivery of shipping cask equipment. Projected computer demands continue to increase to meet advanced computational requirements, i.e. three-dimensional nuclear, thermal, and structural analyses. This

Program Activity	FY 1989	FY 1990	FY 1991
	equipment to manage mainframe computer input and output loads and to provide increased on line memory, data storage and memory processor capabilities, and increased interactive access for the growing number of users. Replacement of seven year old computers at Bettis is also required to support administrative computing requirements. Design of shipping cask equipment for transporting expended cores from the Expended Core Facility to the Chemical Processing Plant is also planned. The cask equipment will provide the necessary capacity required to handle the growth in expended core work projected for the early 1990's.	and secondary memory and disk capacity. In addition, the laboratories will replace their Computer Aided Drafting Systems which will have reached design life; and KAPL will upgrade the information and technical support systems.	is needed to meet the analytical requirements for advanced plant designs and allow extension of the life and performance of operating ships. The increase will be met at KAPL by general computer and storage upgrades. Bettis will upgrade its information and technical support system to be in line with KAPL's system.
	($28,800)	($32,400)	($33,800)

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Non-Major Items of Equipment

Includes replacement, upgrade, and addition of the following types of equipment: laboratory engineering and test equipment such as autoclaves, data recorders, gauges, oscilloscopes; fabrication process development equipment such as furnaces, welding and milling machines; chemical and physical analysis equipment such as mass spectrometers; radiation and safety equipment such as survey meters; examination, handling, storage, and processing equipment for expended core and irradiated test specimen examination and processing; and, prototype component replacement and modifications.

	($19,200)	($20,790)	($21,600)
TOTAL CAPITAL EQUIPMENT	$48,000	$53,190	$55,400

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)
KEY ACTIVITIES SUMMARY
CONSTRUCTION PROJECTS

NAVAL REACTORS DEVELOPMENT

IV. A. Construction Project Summary

Project No.	Project Title	Total Prior Year Obligations	FY 1990 Request	FY 1991 Request	Unappropriated Balance	TEC
GPN-101	General Plant Projects	0	0	$ 8,600	0	$ 8,600
90-N-101	General Plant Projects		$ 8,373	0	0	$ 8,373
90-N-102	Expended Core Facility Dry Cell	0	$ 3,546	$ 4,000	$41,200	$ 48,746
90-N-103	Advanced Test Reactor Off-Gas Treatment System	0	$ 197	$ 1,800	$ 3,300	$ 5,297
90-N-104	Facilities Renovations	0	$ 3,842	$ 7,900	$10,500	$ 22,242
89-N-102	Heat Transfer Test Facility	$ 2,800	$ 6,403	$ 3,600	0	$ 12,803
89-N-103	Advanced Test Reactor Modifications	$ 1,600	$ 3,054	$ 0	0	$ 4,654
89-N-104	Power System Upgrade	$ 600	$ 6,304	0	0	$ 6,904
88-N-102	Expended Core Facility Receiving Station	$ 8,000	$ 2,955	$ 1,500	0	$ 12,455
TOTAL NAVAL REACTORS DEVELOPMENT PROGRAM CONSTRUCTION		$13,000	$34,674	$27,400	$55,000	$130,074

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(Dollars in Thousands)
KEY ACTIVITY CONSTRUCTION PROJECT SUMMARIES
NAVAL REACTORS DEVELOPMENT

IV. B. Plant Funded Construction Project

1. Project Title and Location: GPN-101; General Plant Projects
Various Locations

Project TEC: $8,600
Start Date: 1st Qtr. FY 1991
Completion Date: 4th Qtr. FY 1992

2. Financial Schedule:

Fiscal Year	Appropriations	Obligations	Costs
1991	$ 8,600	$ 8,600	$ 5,000
1992	--	--	3,600

3. Narrative:

(a) This project will provide necessary minor improvements, alterations, and additions to Naval Reactors' laboratories and associated prototype nuclear propulsion plant sites. In general, these projects will consist of utility and building upgrades, additions to exisiting facilities, and land improvements.

(b) The efforts planned under this project are necessary to: ensure that extant and future programs can proceed efficiently; maintain and improve safeguard and security capabilities; improve energy conservation; get maximum use from aging facilities; and, ensure continued compliance with environmental regulations. The planned FY 1991 general plant projects reflect continued attention to aging facilities, whose upgrades have been deferred in recent years to support prototype servicing, safeguard, security and environmental efforts.

(c) FY 1991 efforts will include conceptual and detailed design work, long lead material procurements, site preparations for minor construction, and commencement of building and utility improvements and upgrades.

4. Total Project Funding (COSTS)	Prior Years	FY 1991	To Complete
Construction	0	5,000	3,600
Capital Equipment	0	0	0
Operating Expenses	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(Dollars in thousands)
KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY
NAVAL REACTORS DEVELOPMENT

IV. B. Plant Funded Construction Project

1. Project Title and Location: 90-N-102; Expended Core Facility Dry Cell Project
Naval Reactors Facility, Idaho

Project TEC: $48,746
Start Date: 1st Qtr. FY 1990
Completion Date: 4th Qtr. FY 1995

2. Financial Schedule:

Fiscal Year	Appropriations	Obligations	Costs
1990	$ 3,546	$ 3,546	$ 2,246
1991	4,000	4,000	3,960
1992	15,000	15,000	9,410
1993	13,600	13,600	15,165
1994	7,800	7,800	12,425
1995	4,800	4,800	5,540

3. Narrative:

(a) The Expended Core Facility (ECF) Dry Cell Project will consist of a dry shielded fuel handling, disassembly, examination and shipping facility, a decontamination shop, and a shielded repair shop. The dry cell will contain a semi-automated production line to receive and prepare fuel for shipment to the Idaho Chemical Processing Plant for chemical dissolution and recovery of unused uranium. The decontamination and repair shops will be integrally connected to the dry cell, and to existing water pits, to allow routine servicing of equipment without removing equipment from a shielded environment. A 10,000 square foot extension to the existing facility will be used to house necessary control, receiving, storage, and training spaces.

(b) Core examinations and preparations for shipping and dissolution are currently performed in water pits. This method is labor intensive, has notable technical disadvantages, and involves a significant burden of deliberately redundant administrative and physical controls for nuclear safety. The receipt of expended nuclear cores will increase significantly by 1992. This surge will be compounded by the fact that many of these cores will be larger and heavier than those that are currently processed in the water pits. Existing facilities and systems can not be economically upgraded and automated to meet the projected workload increases. The Dry Cell Project is essential to continued timely handling of expended cores in support of scheduled Naval nuclear-powered vessel refuelings.

(c) In FY 1991, site preparation and detailed design of the decontamination and repair shops and dry cell equipment will begin.

4. Total Project Funding (COSTS)	Prior Years	FY 1990	FY 1991	To Complete
Construction	0	2,246	3,960	42,540
Capital Equipment	0	0	0	0
Operating Expenses	1,000	0	0	136

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(Dollars in Thousands)
KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY
NAVAL REACTORS DEVELOPMENT

IV. B. Plant Funded Construction Project

1. Project Title and Location: 90-N-103; Advanced Test Reactor Off-Gas Treatment System, Idaho National Engineering Laboratory, (INEL), Idaho

Project TEC: $ 5,297
Start Date: 2nd Qtr. FY 1990
Completion Date: 3rd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriations	Obligations	Costs
1990	$ 197	$ 197	$ 147
1991	1,800	1,800	290
1992	2,800	2,800	1,900
1993	500	500	2,960

3. Narrative:

(a) This project will provide a treatment system to reduce radioactive emissions originating in the reactor vessel of the Advanced Test Reactor (ATR) located at the Idaho National Engineering Laboratory. The system will draw air through the ATR primary coolant system degassing tank, process the air, monitor the effluents for radioactivity and discharge the effluents directly through the existing ATR stack. The system will also improve the ability to monitor, contain, and control the plant during normal operating conditions or in the event of an accident.

(b) The ATR, at the Idaho National Engineering Laboratory, provides a nuclear environment for the testing of materials used in Naval nuclear propulsion plants. This modification will lead to a factor of 10 reduction in released radioactivity and to improved ability to operate the plant and respond to emergencies.

(c) Design work will continue in FY 1991. Initial procurements will begin to support FY 1992 construction and installation.

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4. Total Project Funding (COSTS)	Prior Years	FY 1990	FY 1991	To Complete
Construction	0	147	290	4,860
Capital Equipment	0	0	0	0
Operating Expenses	80	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(Dollars in thousands)
KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY
NAVAL REACTORS DEVELOPMENT

IV. B. Plant Funded Construction Project

1. Plant Title and Location: 90-N-104; Facilities Renovation, Knolls Atomic Power Laboratory, (KAPL), Niskayuna, New York

Project TEC: $22,242
Start Date: 1st Qtr. FY 1990
Completion Date: 4th Qtr. FY 1992

2. Financial Schedule:

Fiscal Year	Appropriations	Obligations	Costs
1990	$ 3,842	$ 3,842	$ 1,442
1991	7,900	7,900	6,000
1992	7,600	7,600	8,100
1993	2,900	2,900	6,700

3. Narrative:

(a) This project provides for the replacement or upgrade of aging KAPL laboratory and prototype site facilities, utilities and equipment. The project is aimed at improving utility performance and efficiency, at extending the useful lives of potentially obsolete facilities, and at providing enhanced environmental protection. The project includes: facility renovations, (sewage treatment plants, electrical distribution systems); facility replacements, (storage tanks, hazardous material storage facilities, water re-use systems), and landfill efforts.

(b) The facilities and equipment at KAPL and its associated prototype plant sites average 30 years in age. Many of them have long surpassed their useful service lives. The upgrades included in this project must proceed to allow continued compliance with radiological control requirements, the decommissioning of contaminated facilities, and reliable utility service at all three sites. All planned work will ensure continued plant operations and research and development efforts in reliable and environmentally safe surroundings.

(c) In FY 1991, design efforts will be completed and construction contracts will be placed for landfill work, sewage treatment plants, and the hazardous material storage building.

4. Total Project Funding (COSTS)	Prior Years	FY 1990	FY 1991	To Complete
Construction	0	1,442	6,000	14,800
Capital Equipment	0	0	0	0
Operating Expenses	0	0	0	600

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(Dollars in Thousands)
KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY
NAVAL REACTORS DEVELOPMENT

IV. B. Plant Funded Construction Project

1. Project Title and Location: 89-N-102; Heat Transfer Test Facility
Knolls Atomic Power Laboratory
Niskayuna, New York

Project TEC: $12,803
Start Date: 1st Qtr. FY 1989
Completion Date: 4th Qtr. FY 1992

2. Financial Schedule:

Fiscal Year	Appropriated	Obligations	Costs
1989	$ 2,800	$ 2,800	$ 900
1990	6,403	6,403	7,903
1991	3,600	3,600	2,400
1992	--	--	1,600

3. Narrative:

(a) This project provides for construction of the Heat Transfer Test Facility. The Facility will consist of autoclave stations and steam generator test loops and will be located in the existing Experimental Engineering Laboratory. The steam generator test loops will be capable of independent operation. The primary system of each loop will consist of a gas fired preheater, piping, pressurizer and pump. The system will provide pressurized hot water that will be the source of power for the secondary system. The secondary system of each loop will consist of steam generator test vessels, piping, pumps, water chemistry control and injection systems, regenerative heat exchangers and a condenser. Both systems will be designed for high pressure and temperature operations. Autoclave systems and related support equipment will be relocated from another existing building to establish a comprehensive test facility.

(b) The facility will support lighter, more compact and reliable heat transfer technology. The steam generator concepts under development require extensive materials corrosion, secondary water chemistry, heat transfer, and hydraulic testing. Since these test programs will be complex and affected by many parameters, test facilities that permit prototypical simulation of the actual steam generator design and operating conditions are needed to minimize test uncertainties. The Heat Transfer Test Facility will meet these testing needs and will be the only large scale facility suitable for materials corrosion and water chemistry testing of scale test assemblies. The autoclave stations will be used to study the effects of reactor coolants. The tests will cover the chemical reactions of the coolant with the plant metals, and the effects of the corrosion products produced by these chemical reactions.

(c) In FY 1991 equipment will be installed into spaces renovated in FY 1990.

4. Total Project Funding (COSTS)	Prior Years	FY 1989	FY 1990	FY 1991	To Complete
Construction	0	900	7,903	2,400	1,600
Capital Equipment	0	0	0	0	0
Operating Expenses	70	0	800	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(Dollars in thousands)
KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY
NAVAL REACTORS DEVELOPMENT

IV. B. Plant Funded Construction Project

1. Project Title and Location: 88-N-102, Expended Core Facility Receiving Station; Naval Reactors Facility, Idaho.

Project TEC: $12,455
Start Date: 1st Qtr. FY 1988
Completion Date: 4th Qtr. FY 1991

2. Financial Schedule:

Fiscal Year	Appropriated	Obligations	Costs
1988	$ 2,100	$ 2,100	$ 1,800
1989	5,900	5,900	2,400
1990	2,955	2,955	5,555
1991	1,500	1,500	2,400
1992	--	--	300

3. Narrative:

(a) The Expended Core Facility (ECF) Receiving Station will consist of a shipping container unloading and maintenance area. The shipping containers are used to send expended nuclear fuel from shipyards to ECF. The new area will provide for unloading of the expended nuclear fuel, maintenance and reuse preparation of container and railcar, and inspection and modification of container internals to facilitate shipment of a variety of naval cores. The area will process two shipping containers concurrently. It will be designed for a 40-year life, and be built of structural steel on a concrete base.

The project will include: extension of the existing building to provide space and access by the existing overhead cranes, rail and truck bay service, dual container receiving and unloading structure, air handling system, semiautomated inspection and maintenance areas, glove box enclosures, computer system and controls, underwater fuel receipt, inspection, and queuing area, and all auxiliary and utility features required for operating efficiency and safety.

(b) The purpose of this project is to establish a dedicated receiving area at ECF to accommodate the increase in nuclear fleet refuelings. ECF must be able to turn around shipping containers promptly to support fleet refueling schedules. An inability to do so would delay nuclear-powered warship refuelings and, thus, fleet operations.

Completion of the dedicated receiving station will:

a. Provide the capacity needed to receive and unload expended fuel shipping containers to support the projected increase in workload and minimize the number of required expensive shipping containers.

b. Improve work efficiency by a factor of two (about a 50 percent savings per shipping container) so that the increase in expended fuel receipts can be accommodated with a small increase in personnel.

c. Provide self-contained and remote servicing, inspection and maintenance facilities to reduce the time spent in radiological environments and reduce the possibility of personnel contamination.

(c) In FY 1991 all newly installed systems will be qualified, personnel will be trained and the receiving station will become operational.

4. Total Project Funding (COSTS)

	Prior Years	FY 1989	FY 1990	FY 1991	To Complete
Construction	1,800	2,400	5,555	2,400	300
Capital Equipment	0	0	0	0	0
Operating Expenses	500	0	0	0	0

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VOLUME 1

WASTE TRANSPORTATION AND SITE MANAGEMENT

DEPARTMENT OF ENERGY

FY 1991 CONGRESSIONAL BUDGET REQUEST

ATOMIC ENERGY DEFENSE ACTIVITIES

VOLUME 1

WASTE TRANSPORTATION AND SITE MANAGEMENT

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
WASTE TRANSPORTATION AND SITE MANAGEMENT
(dollars in thousands)

LEAD TABLE

Activity	FY 1989 Actual	FY 1990 Approp.	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Program Direction/ Landlord	$ 5,676	$ 13,152	$ 13,152	$ 21,386	+ 8,234	+ 63
Transportation Management	9,720	11,633	11,633	14,660	+ 3,027	+ 26
Capital Equipment	15,207	15,798	15,798	19,098	+ 3,300	+ 21
Construction	13,642	19,270	19,270	30,856	+11,586	+ 60
Total, Waste Transportation and Site Management Program	$ 44,245	$ 59,853	$ 59,853	$ 86,000	+26,147	+ 44
Staffing (FTEs)	11	133	133	133		
Headquarters	11	11	11	11		
Field	0	122	122	122		

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
WASTE TRANSPORTATION AND SITE MANAGEMENT
(dollars in thousands)

SUMMARY OF CHANGES

FY 1990 Appropriation	$ 59,853
Adjustments	-0-
FY 1991 Base	$ 59,853
Program Direction/Landlord	
· Increase provides for 122 FTEs located at four DOE Operations Offices, initiation of five-year maintenance program to bring Idaho Landlord Facilities into safety and regulatory compliance, growth in Dose Reconstruction Study at Richland, and provides planning and design support for Richland Landlord Environmental Compliance Activities.	$ + 8,234
Transportation Management	
· Increase preparations for initiation of package tracking system on a trial basis, prepare additional characterization data on contact-handled and remote-handled transuranic wastes, and initiate a generic Environmental Impact Statement on transportation of radioactive materials.	+ 3,027
Capital Equipment	
· Increase continues equipment upgrades to restore the safety and reliability of badly deteriorated general support facilities and equipment at Richland and Idaho.	+ 3,300
Construction	
· Increase provides for continuation of general plant projects at various locations, Landlord Safety Compliance and Idaho (INEL) Road Renovation. Also, includes new starts for INEL Transportation Complex and 300 Area Electrical Distribution Project at Richland.	+ 11,586
FY 1991 Congressional Budget Request	$ 86,000

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)
KEY ACTIVITY SUMMARY

WASTE TRANSPORTATION AND SITE MANAGEMENT

I. Preface: Program Direction/Landlord

Program Direction funds provide for the salaries and related costs for 11 full-time equivalent (FTE) personnel in Headquarters who oversee Department-wide transportation management activities to assure the safe, secure and economical transportation of DOE materials including radioactive and other hazardous materials and waste. In addition 122 FTEs are located at four DOE Operations Offices (69 at Richland, 40 at Savannah River, 29 at Idaho Falls, and 4 at San Francisco). The inclusion of the 122 FTEs for DOE Operations Offices reflects a decision by the Department to more accurately cost those field personnel under the programs which they execute. The landlord responsibilities funded at both Idaho and Richland are to maintain the sitewide infrastructure through central planning, maintenance, procurement and construction of common use equipment, facilities, utilities and roadways. The landlord program also supports health, security, planning and inspection activities that cannot be directly associated with a specific program.

II. A. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Program Direction				
Transportation Management	$ 2,500	$ 2,950	$ 1,389	- 53
Operations Offices	600	5,340	6,811	+ 28
Subtotal, Program Direction	$ 3,100	$ 8,290	$ 8,200	- 1
Landlord				
Idaho	$ 928	$ 798	$ 4,424	+454
Richland	1,648	4,064	8,762	+116
Subtotal, Landlord	$ 2,576	$ 4,862	$13,186	+171
Total, Program Direction/Landlord	$ 5,676	$13,152	$21,386	+ 63

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II. B. Major Laboratory and Facility Funding

Not Applicable

III. Activity Description (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Program Direction - Transportation Management	Provided salaries and benefits, contractual services, and travel for the Headquarters oversight staff.	Continues salaries and benefits, contractual services, and travel for Headquarters staff.	Provides salries and benefits, contractual services and travel for 11 FTEs associated with managing the department-wide radioactive and hazardous materials and waste transportation program.
	$ 2,500	$ 2,950	$ 1,389
- Operations Offices	Provides for salaries, benefits and related costs associated with landlord activities at field sites.	The Department proposes to support 122 FTEs in this category to reflect more accurately the true costs of the program. These personnel were formerly supported from overhead.	Provides funding for 122 FTEs at four DOE Operations Offices (49 at Richland, 40 at Savannah River, 29 at Idaho Falls and 4 at San Francisco).
	600	5,340	6,811
Subtotal, Program Direction	$ 3,100	$ 8,290	$ 8,200

Program Activity	FY 1989	FY 1990	FY 1991
Landlord			
- Idaho	Provided sitewide services, management, planning, analyses and inspection to support continuity of operations, safety, and compliance with applicable Federal and DOE regulations.	Continues to provide sitewide services as in prior year. Begins support of National Oceanic Atmospheric Administration specialized meteorological assistance at INEL, replacing support previously supplied by breeder reactor program.	Same activities as in prior years. Increases are for initiation of 5-year maintenance program to bring landlord facilities into safety and regulatory compliance, and to provide new sanitary landfill in Central Facilities Area. Provides for replacement of one twin-engine helicopter for use by the security contractor at INEL. The replacement is through a lease-to-ownership arrangement.
	$ 928	$ 798	$ 4,424

PROGRAM ACTIVITY	FY 1989	FY 1990	FY 1991
- Richland	Provided sitewide services, management planning, analyses and inspection to support continuity of operations, safety, and regulatory compliance.	Continues same activities as in prior year. Increase supports Dose Reconstruction Study formerly funded by Nuclear Materials Production.	Same activities as in prior years. Increases are for growth in Dose Reconstruction Study; additional studies required to maintain site infrastructure, quality assurance, safety assessments and security provisions; provides planning and design support for landlord environmental compliance activities.
	$ 1,648	$ 4,064	8,762
Subtotal, Landlord	$ 2,576	$ 4,862	$13,186

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
(dollars in thousands)

KEY ACTIVITY SUMMARY
WASTE TRANSPORTATION AND SITE MANAGEMENT

I. Preface: Transportation Management

Transportation Management is responsible for assuring the safe, secure, and economical transportation of DOE materials, including radioactive and other hazardous materials and waste, to meet the needs of Departmental programs. It oversees the policy, direction, audit, and appraisal of the transportation operations, traffic management, packaging operations management, and information and communications programs of the Department and assures the uninterrupted flow of all goods and materials of the Department to achieve production and waste management, environmental restoration, and technology development goals and objectives. It is also responsible for the direction and coordination of DOE-wide integrated transportation research, development, testing, and evaluation programs; package certification support activities, technology in support of regulatory policy development; and, transportation institutional liaison.

II. A. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Transportation Management	$ 9,720	$11,633	$14,660	26

B. Major Laboratory and Facility Funding

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Argonne National Laboratory	$ 284	$ 205	$ 205	0
Oak Ridge Operations	2,417	3,483	3,483	0
Sandia National Laboratories	3,450	3,901	5,918	52
Hanford Reservation	2,105	2,362	2,862	0
Oak Ridge National Laboratory	60	0	0	0
Los Alamos National Laboratory	25	0	0	0

III. Activity Description

Transportation Management	FY 1989	FY 1990	FY 1991
	Continued to support safe and efficient transportation and packaging operations, training, and development of transportation information resources. Began operations mode of the Transportation Communication (TRANSCOM). Initiated transportation rate quotation system, new training modules, package tracking system, and transportation institution program.	Continued to support safe and efficient transportation and packaging operations, TRANSCOM, the development of the package tracking system, transportation emergency preparedness, expanded training and development of transportation information resources. Initiate operations of the rate quotation and prepayment audit system. Expand the institutional program.	Continues to support safe and efficient transportation and packaging operations, TRANSCOM, training of transportation personnel, development of transportation information resources, rate quotation and prepayment audit system, transportation institutional program and emergency preparedness. The package tracking system will be initiated on a trial basis.
	Transportation R&D continued to provide technology to solve DOE transportation and packaging problems and to support institutional and regulatory issues. Activity areas included: engineering analysis; testing; advanced technology development; packaging certification support; regulatory support, standards of development and technology transfer; and safety and systems assessment.	Transportation R&D will continue to provide technology to solve DOE transportation and packaging problems. Advances are expected in defense waste source term models and ductile cast iron cask drop tests. Activities in support of institutional and regulatory issues will result in an improved computer code to support risk analyses of radioactive materials transportation.	R&D activities will continue to provide technology to solve DOE transportation and packaging problems. Additional characterization data will be provided on contact-handled and remote-handled transuranic wastes. In support of institutional and regulatory issues, new data will be collected for the revision of International Atomic Energy Agency regulations. A generic Environmental Impact Statement on the transportation of radioactive materials is to begin.
	No activity.	Begin planning for a generic transportation Environmental Impact Statement.	A generic Environmental Impact Statement on the transportation of radioactive materials will be initiated.
Subtotal, Transportation Management	$ 9,720	$11,633	$14,660

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES

(dollars in thousands)

KEY ACTIVITY SUMMARY

WASTE TRANSPORTATION AND SITE MANAGEMENT

I. Preface: Capital Equipment

The FY 1991 capital equipment request provides critical base programmatic equipment. The requested funding supports the continuation of equipment upgrades to restore the safety and reliability of badly deteriorated general support facilities and equipment in the Richland and Idaho Landlord programs. It also provides replacement items that are important to the safety and reliability of continued waste operations. These equipment needs consist of items with a life span of several years for which rental or lease costs exceed the purchase price and the replacement of existing deteriorated and obsolete items. Failure of existing equipment is frequent and maintenance costs in conjunction with the attendant radiation exposure to maintenance personnel are not acceptable. In many instances, parts are no longer available and equipment replacement is more cost-effective than repair. Equipment funding is distributed by major program areas as shown below.

II. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Transportation Management	$ 483	$ 507	$ 531	+5
Program Direction/Landlord	14,724	15,291	18,567	+21
Total, Capital Equipment	**$15,207**	**$15,798**	**$19,098**	**+21**

B. Major Laboratory and Facility Funding

Not applicable.

III. Activity Description (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Transportation Management	Supported procurement of communication equipment for Transportation Communication System (TRANSCOM) and required hardware and testing equipment.	Complete the acquisition of a mobile instrumentation system. Provide equipment in support of TRANSCOM. Support packaged database and information program.	Continues upgrade of package drop test capability. Extends test instrumentation measurement capability. Supports packaging database.
	$ 483	$ 507	$ 531
Program Direction/ Landlord	Procured urgently required capital equipment to maintain common support and non-programmatic facilities, systems, and services such as steam supply, business/information services, general purpose buildings, electrical distribution systems, railroads, roads, sanitary waste disposal, telecommunications, fire protection, transportation, site security, environmental monitoring, and standards laboratory.	Same activities as in prior year. Increase is for escalation.	Same activities as in prior years. Increases are to begin a multi-year program to arrest the growth of the backlog of capital equipment replacements and additions required to adequately support site infrastructure requirements, and comply with Federal standards and DOE Orders.
	$14,724	$15,291	$18,567
Subtotal, Capital Equipment	**$15,207**	**$15,798**	**$19,098**

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
WASTE TRANSPORTATION AND SITE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. A. Construction Project Summary

III. Construction

	Total Prior Appropriation	FY 1990	FY 1991	Unapprop. Balance	TEC
91-GPP-171 GPP, Various Locations	$ 7,558	$ 8,297	913,956	$ 0	$ N/A
91-D-170 INEL Transportation Complex	0	0	870	10,230	11,100
91-D-175 300 Area Electrical Distribution	0	0	900	5,400	6,300
90-D-175 Landlord Safety Compliance	0	3,684	8,230	16,686	28,600
89-D-171 INEL Road Renovation	4,000	7,289	7,300	7,300	26,000
86-D-175 INEL Security Upgrade	2,084	0	0	N/A	N/A
Subtotal Waste Transportation Site Management	913,642	819,270	830,856	$ N/A	$ N/A

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
WASTE TRANSPORTATION AND SITE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project GPD-171, General Plant Projects, Various Locations

PROJECT TEC: $ 13,556
START DATE: 1ST Qtr FY 1991
COMPLETION DATE: 4TH Qtr FY 1991

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 13,556	$ 13,556	$ 13,556

3. Narrative:

These projects provide various items of new construction, additions, alterations, and improvements to the lands, buildings, and utility systems at the Richland and Idaho offices to support waste management program needs in health, safety, environment, general support, and other program requirements. Some of the projects may be located on non-Government land.

The FY 1991 funding will be used for design, procurement, and construction activities.

4. Total Project Funding (BA):

Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete

Not applicable.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
WASTE TRANSPORTATION AND SITE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 91-D-170, INEL Transportation Complex, Idaho National Laboratory (INEL), Idaho

PROJECT TEC: $ 11,100
START DATE: 1ST Qtr FY 1991
COMPLETION DATE: 1st Qtr FY 1994

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 870	$ 870	$ 790
1992	5,500	5,500	4,880
1993	4,730	4,730	4,960
1994	0	0	470

3. Narrative:

The Transportation Complex will consolidate all INEL vehicle and equipment repair shops and operations/administrative offices under one roof. The facility will consolidate functions presently being performed in six of the seven major transportation operations buildings now used at the Central facilities Area (CFA) and will include a light truck and auto repair shop, bus and heavy equipment shop, body shop, brake repair shop, paint booth, washing and cleaning area, tire repair area, fuel dispensing facility, parts issue and storage area, administrative offices, conference room training room, lunch room, driver ready room, used oil collection facility, and restrooms. Standard utilities such as water, sewer, and power will be provided.

The FY 1991 funding will provide for Preliminary and Final designs (Title I and II).

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction.....	$ 0	$ 0	$ 0	$ 870	$ 10,230
Capital Equipment.....	0	0	0	0	0
Operating Expenses.....	75	0	0	0	0

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
WASTE TRANSPORTATION AND SITE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 91-D-175, 300 Area Electrical Distribution Conversion and Safety Improvements, Phase I, Richland, WA

PROJECT TEC: $ 6,300
START DATE: 2nd Qtr FY 1991
COMPLETION DATE: 3rd Qtr FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 900	$ 900	$ 610
1992	5,200	5,200	3,950
1993	200	200	1,740

3. Narrative:

This project is required to provide a safe, efficient, and reliable electrical service. The project will also upgrade lighting and signal circuits in the southern portions of the 300 Area.

The FY 1991 appropriation will be used for design and early procurement.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction.....	$ 0	$ 0	$ 0	$ 900	$ 5,400
Capital Equipment.....	0	0	0	0	0
Operating Expenses.....	0	0	140	30	100

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
WASTE TRANSPORTATION AND SITE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 90-D-175, Landlord Program Safety Compliance-1, Richland, WA

PROJECT TEC: $ 28,600
START DATE: 1st Qtr FY 1991
COMPLETION DATE: 2nd Qtr FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 3,684	$ 3,684	$ 1,740
1991	8,230a/	8,230	8,684
1992	6,105	6,105	7,489
1993	4,845	4,845	4,951

3. Narrative:

This line item includes four subprojects to eliminate safety deficiencies in Landlord facilities.

Water System -- Two new fire protection reservoirs and associated pumps and piping to meet a DOE Order and National Fire Protection Association (NEPA) standards.

Restored Mainline -- Replace 23 miles of track to complete rehabilitation of the in-service railroad at Hanford.

Firewater Storage and Distribution -- Replace/upgrade electrical systems in the 44 year-old system generation facilities (200 Area) to comply with current codes.

a/ Request is for Landlord Program Activities only; Waste Management Activities in the Five-Year Plan are not included.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction.....	$ 0	$ 0	$ 3,684	$ 8,230	$ 10,950
Capital Equipment.....	0	0	0	0	0
Operating Expenses.....	0	556	60	50	60

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET EQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES
WASTE TRANSPORTATION AND SITE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 89-D-171, INEL Road Renovation, Richland, WA

PROJECT TEC: $ 26,000
START DATE: 3rd Qtr FY 1989
COMPLETION DATE: 4th Qtr FY 1992

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1989	$ 4,000	$ 4,000	$ 3,370
1990	7,239	7,289	7,710
1991	7,300	7,300	7,460
1992	7,300	7,300	7,460

3. Narrative:

This project provides for renovating approximately 22 miles of INEL primary roads. These roads do not currently meet the standards of the Corps of Engineers and the American Public Works Association.

FY 1991 funding continues construction on a portion of the primary access highway to the Idaho Chemical Processing Plant, Central Facilities Area and Test Reactor Area.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction.....	$ 0	$ 4,000	$ 7,289	$ 7,300	$ 7,300
Capital Equipment.....	0	0	0	0	0
Operating Expenses.....	20	0	0	0	0

DOE/MA-0388
Volume 2 of 5

United States Department of Energy
Fiscal Year 1991

Congressional Budget Request

Energy Supply Research and Development

Volume 2

Assistant Secretary,
Management and Administration
Office of the Controller

January 1990

(387)

DEPARTMENT OF ENERGY

FISCAL YEAR 1991 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 2

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Department of Energy
FY 1991 Congressional Request

Summary of Estimates by Appropriation
Budget Authority
(Dollars in Million)

	FY 1989 Actual	FY 1990 Approp	FY 1991 Departmental Request
Appropriation Before the Energy and Water Development Subcommittees:			
Atomic Energy Defense Activities	$6,752,575	$7,722,905	$8,592,000
General Science and Research Activities	908,471	1,093,316	1,273,732
Isotope Production and Distribution Fund	(209)	16,016	0
Energy Supply Research and Development	1,848,973	1,892,087	2,085,237
Environmental Restoration and Waste Management	1,657,347	2,218,317	2,791,436
Uranium Supply and Enrichment Activities	(244,053)	(4,745)	0
FERC - Salaries and Expenses	108,760	114,918	122,750
Nuclear Waste Disposal Fund	366,832	295,156	292,833
Geothermal Resources Development Fund	75	74	80
Power Marketing Administrations:			
Alaska Power Administration	3,159	3,134	3,233
Bonneville Power Administration	159,517	258,200	170,100
Southeastern Power Administration	36,267	18,456	9,285
Southeastern - Continuing Fund	3,072	0	0
Southwestern Power Administration	15,389	25,257	20,107
Western Area Power Administration	271,145	294,218	298,464
Total, Power Marketing Administrations	488,549	599,065	501,189
Departmental Administration	213,848	202,185	224,427
Office of Inspector General	20,959	22,638	28,421
Total, Appropriation Before the Energy And Water Development Subcommittees	$12,122,127	$14,171,932	$15,912,105

Department of Energy
FY 1991 Congressional Request

Summary of Estimates by Appropriation
Budget Authority
(Dollars in Million)

	FY 1989 Actual	FY 1990 Approp	FY 1991 Departmental Request
Appropriation Before the Interior and Related Agencies Subcommittees:			
Clean Coal Technology	187,800	554,000	456,000
Fossil Energy Research and Development	380,025	416,641	202,309
Naval Petroleum and Oil Shale Reserve	185,071	189,439	210,610
Energy Conservation	316,809	370,918	182,591
Energy Regulation	18,668	18,198	16,408
Emergency Preparedness	6,154	6,551	6,467
Strategic Petroleum Reserve	173,421	192,483	195,633
Strategic Petroleum Account	242,000	435,865	228,393
Energy Information Activities	62,856	64,319	66,608
Total, Appropriation Before the Interior and Related Agencies Subcommittees	1,572,804	2,248,414	1,565,019
Total, Appropriation Before the Energy and Water Development Subcommittees	12,122,127	14,171,932	15,912,105
Payment to States	2,249	2,249	2,343
Total, Department of Energy	$13,697,180	$16,422,595	$17,479,467

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1989 FTE USAGE	FY1990 -FY89	FY1990 CONGR REQ	FY1991 -FY90	FY1991 CONGR REQ
ENERGY & WATER SUBCOMMITTEE					
HEADQUARTERS	4,926	558	5,484	99	5,583
FIELD	9,480	-63	9,417	-179	9,238
SUBCOMMITTEE TOTAL	14,406	495	14,901	-80	14,821
INTERIOR SUBCOMMITTEE					
HEADQUARTERS	1,212	-42	1,170	-52	1,118
FIELD	917	12	929	-90	839
SUBCOMMITTEE TOTAL	2,129	-30	2,099	-142	1,957
GRAND TOTAL	16,535	465	17,000	-222	16,778
ADJUSTMENT				-16	-16
ADJUSTED TOTAL	16,535	465	17,000	-238	16,762

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1989 FTE USAGE	FY1990 -FY89	FY1990 CONGR REQ	FY1991 -FY90	FY1991 CONGR REQ
10:ENERGY SUPPLY RESEARCH AND DEV	958	118	1,076	7	1,083
HEADQUARTERS	678	119	797	7	804
FIELD	280	-1	279	0	279
15:URANIUM ENRICHMENT	62	5	67	0	67
HEADQUARTERS	52	4	56	0	56
FIELD	10	1	11	0	11
17:ISOTOPE PRODUCTION AND DISTRIB	0	2	2	0	2
HEADQUARTERS	0	2	2	0	2
20:GENERAL SCIENCE AND RESEARCH	49	37	86	12	98
HEADQUARTERS	49	37	86	12	98
25:ATOMIC ENERGY DEFENSE ACTIVITI	2,999	411	3,410	45	3,455
HEADQUARTERS	550	267	817	40	857
FIELD	2,449	144	2,593	5	2,598
27:ENV RESTORATION & WASTE MGT	68	113	181	20	201
HEADQUARTERS	68	36	96	20	116
FIELD	0	77	85	0	85
30:DEPARTMENTAL ADMINISTRATION	3,347	-200	3,147	0	3,147
HEADQUARTERS	1,692	-20	1,672	0	1,672
FIELD	1,655	-180	1,475	0	1,475
32:INSPECTOR GENERAL	189	81	248	16	256
HEADQUARTERS	189	81	248	16	256
34:ALASKA POWER ADMINISTRATION	31	4	35	0	35
FIELD	31	4	35	0	35
36:BONNEVILLE POWER ADMIN	3,318	-80	3,238	-188	3,130
FIELD	3,318	-80	3,238	-188	3,130
38:SOUTHEASTERN POWER ADMIN	38	2	40	0	40
FIELD	38	2	40	0	40
42:SOUTHWESTERN POWER ADMIN	186	-2	184	2	186
FIELD	186	-2	184	2	186
44:WAPA - POWER MARKETING	1,163	-20	1,143	-83	1,060
FIELD	1,163	-20	1,143	-83	1,060
50:WAPA - COLORADO RIVER BASIN	248	0	248	0	248
FIELD	248	0	248	0	248
52:FEDERAL ENERGY REGULATORY COMM	1,497	73	1,570	0	1,570
HEADQUARTERS	1,497	73	1,570	0	1,570
54:NUCLEAR WASTE FUND	268	-19	249	1	250
HEADQUARTERS	158	-11	147	4	151
FIELD	110	-8	102	-3	99
56:GEOTHERMAL RESOURCES DEV FUND	1	0	1	0	1
HEADQUARTERS	1	0	1	0	1
63:CLEAN COAL TECHNOLOGY	53	5	58	5	63
HEADQUARTERS	21	5	26	0	26
FIELD	32	0	32	5	37
65:FOSSIL ENERGY RESEARCH AND DEV	739	-22	717	-68	649
HEADQUARTERS	172	-35	137	18	155
FIELD	567	13	580	-86	494
70:NAVAL PETROL & OIL SHALE RES	92	-3	89	2	91
HEADQUARTERS	19	-1	18	2	20
FIELD	73	-2	71	0	71
75:ENERGY CONSERVATION	339	13	352	-64	288
HEADQUARTERS	208	10	218	-47	171
FIELD	131	3	134	-17	117
80:EMERGENCY PREPAREDNESS	69	2	71	0	71
HEADQUARTERS	69	2	71	0	71
81:ECONOMIC REGULATION	235	-29	206	-25	181
HEADQUARTERS	235	-29	206	-25	181
85:STRATEGIC PETROLEUM RESERVE	148	0	148	0	148
HEADQUARTERS	26	2	28	0	28
FIELD	116	-2	112	0	120
90:ENERGY INFORMATION ACTIVITIES	462	4	466	0	466
HEADQUARTERS	462	4	466	0	466
GRAND TOTAL	16,535	465	17,000	-222	16,778
ADJUSTMENT				-16	-16
ADJUSTED TOTAL	16,535	465	17,000	-238	16,762

VOLUME 2

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

Department of Energy

Proposed Appropriation Language

Energy Supply, Research and Development Activities

For expenses of the Department of Energy activities including the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for energy supply, research and development activities, and other activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed 21 for replacement only), [$2,215,466,000] $2,085,237,000, to remain available until expended [, of which $20,000,000 shall be available only for the following facilities; the Biomedical Research Institute, LSU Medical Center at Shreveport, Louisiana, and the Oregon Health Science University; Provided, That of the amount appropriated herein, $2,500,000 shall be provided to the Midwest Superconductivity Consortium at Purdue University]. (Energy and Water Development Appropriations Act, 1990)

Explanation of Change

Changes to the FY 1990 appropriation language delete provisions unique to fiscal year 1990.

Department of Energy
FY 1991 Congressional Request

Summary of Estimates by Major Activity
Energy Supply Research and Development
Budget Authority
(Dollars in Million)

	FY 1989 Actual	FY 1990 Approp.	FY 1991 Departmental Request
Solar Energy R&D	$89,069	$89,659	$115,873
Geothermal	19,321	18,077	18,000
Hydropower	0	0	1,000
Electric Energy Systems	24,316	17,828	27,347
Energy Storage Systems	11,868	12,047	12,906
Nuclear Energy R&D	347,508	341,847	357,790
Civilian Waste R&D	2,498	977	700
Environment, Safety and Health	88,000	109,002	97,421
Biological and Environmental Research	250,768	308,693	338,794
Magnetic Fusion	344,659	320,259	325,300
Basic Energy Sciences	534,335	569,837	648,682
Energy Res., Os., Anal., & Univ. Support	33,481	36,971	42,617
Multi-Program Laboratories Facilities Sup.	24,387	22,123	23,743
Small Business Innovation Research Prog.	33,104	0	0
Liquified Gaseous Spill Test Facility	1,500	1,025	1,085
In-House Energy Management	19,432	19,474	20,540
Strategic Facilities Utilization Program	2,175	2,144	3,000
Technical Information and Mgmt. Prog.	16,500	14,790	15,000
Policy and Management	7,419	7,334	35,439
Subtotal, Energy Supply R&D	1,850,340	1,892,087	2,085,237
Prior Year Balances and Other Adjustments	(1,367)	0	0
Total, Energy Supply R&D	$1,848,973	$1,892,087	$2,085,237

VOLUME 2

SOLAR AND RENEWABLE ENERGY

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DEPARTMENT OF ENERGY

FISCAL YEAR 1991 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

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SOLAR AND RENEWABLE ENERGY

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

OVERVIEW

SOLAR ENERGY

I. Introduction

The upcoming decade represents a critical period for energy supply in the United States. In the wake of far-reaching changes now occurring in the oil, gas, and electricity markets, the relationship of environmental, economic, and energy policy will be shaped for the twenty-first century. Near term funding decisions will greatly influence the timing and the degree to which the vast domestic and international potential of solar energy can be deployed by industry in the short, mid, and long term. The proposed FY 1991 Solar Energy program attempts to focus federal resources on the highest payoff opportunities; it establishes a balanced effort between applied research and development activities necessary to attract capital and industrial commitments to begin to exploit these energy supply technologies, and longer range research to advance these technologies toward wider scale use in the mid and long term. The U.S. has a virtually inexhaustible long term domestic resource base of energy concentrated in six major energy sources: geothermal, solar, biomass, wind, shale oil, and coal. Of this total domestic energy resource base in the U.S., renewable energy sources make up nearly 93 percent of the total.

II. Planning and Program Summary

While renewable energy technologies currently contribute 9% of domestic energy production, several trends indicate an opportunity for them to perform an even greater role in the future:

Utility Electrical Generation After a decade and a half of relatively slow electrical demand growth the U.S. electric industry is hesitant to engage in large scale generation projects due to their significant capital costs and the uncertainty and timing of future electrical demand increases. But large generating plants take some years to put on line, and a healthy economy may well give rise to demand growth over the next decade. Furthermore, over the next two decades a substantial fraction of existing power plants will reach retirement age. Rising electrical demand is anticipated to converge with constrained supply sometime in the late 1990's, and it is estimated that the U.S. will need to construct or refurbish as much as 100,000 to 250,000 megawatts of electrical capacity by the turn of the century. The fundamental policy objectives concerning economic, environmental, and siting regulations of utility power are undergoing reconciliation and should set the stage for an important role for solar energy based generating systems.

The proposed Solar Energy budget includes a strengthened and streamlined effort to develop solar electrical supply options, focusing on photovoltaic (PV) energy systems. The proposed program supports an R&D base effort and three major development efforts cost-shared with industry: high efficiency thin-film materials; manufacturing-enabling technology development; and development of high efficiency concentrator materials. A successful program of investment in these areas could result in photovoltaic systems competitive for utility peak load applications before the turn of the century, and base load competitive systems after the turn of the century. The Solar Thermal and Wind programs seek to establish technical and economic viability that would allow deployment as peaking and intermediate load generation options before the turn of the century. Research will also be undertaken to identify and control toxic or environmentally damaging emissions and wastes from the combustion of municipal solid waste. To allow for the conduct and support of the strengthened solar program, the budget includes start up construction on the new research facility at SERI. SERI's ability to comply with Federal and Colorado health and safety requirements in its leased building is deteriorating, and current and future R&D efforts cannot remain in the existing space.

Transportation Foreign oil is now required to meet over 40 percent of our total petroleum requirements. The U.S. transportation sector depends on petroleum for nearly 95% of its fuel requirements; an expanding population as well as anticipated growth in GNP suggest that total passenger miles driven and number of vehicles will increase; further improvements in fuel efficiency are neither limitless nor inexpensive; and environmental standards for mobile sources are expected to tighten significantly. For these reasons the demand for liquid fuels will increase despite anticipated automobile fuel economy gains. At the same time, the nation's liquid fuel options are limited in the short to mid term; no single technology is expected to fully displace oil. Development of biomass-based alcohol fuels therefore represents a primary opportunity to contribute to energy security, economic (agricultural and forestry) productivity, and environmental quality national objectives.

The proposed FY 1991 Solar Energy budget seeks to increase biomass supply and develop alcohol fuels conversion technologies. The program concentrates research to deliver the technology for industrial deployment of cost-effective methanol in the mid-term, the time when a substantial number of fuel flexible and neat-alcohol vehicles are expected to undergo deployment. The proposed program additionionally represents a substantial commitment to develop the technical underpinnings for a competitive bio-ethanol industry in the mid to long-term. The proposed efforts, when closely coordinated with research by the Department of Agriculture, should serve as a strong catalyst to mobilize private investment in developing this major domestic resource as a significant fuel option for transportation markets. Thermal processes for biomass conversion to methanol operate in a hydrogen-poor regime, thus the methanol program includes a small level of development of hydrogen sources necessary for ultimate commercial bio-methanol production.

U.S. International Competitiveness Internationally, energy demand is expected to continue to increase, especially in developing countries where electrification efforts are being pursued rapidly as a component of economic development. As developing countries seek to deploy new energy technologies, the already intense international trade competition among developed, exporting countries is expected to accelerate. Solar energy technologies are expected to play an increasing role in developing nations' energy expansion due to their modularity, the widespread availability of the renewable resource, and their flexibility in providing both remote and grid connected power and industrial heat; our competitors have perceived this opportunity and correspondingly increased their solar R&D funding. Opportunities for U.S. gains in international competitiveness will depend in part upon the strength of the research base developed by the DOE program.

The proposed solar budget supports priority programs that develop export-ready technologies including photovoltaics, solar thermal, wind energy, and biofuels. The budget request continues the activities of CORECT, whose purpose is to stimulate cooperative federal/private sector deployment of solar technologies to international markets.

Environmental Considerations Growing awareness of the environmental implications of energy utilization, such as climate change, acid rain, and ozone depletion will heighten the requirements for environmentally safe, economically competitive energy technologies in the future. It is expected that considerations of future energy technologies at both the national and local level will be expanded beyond system economics and reliability, to include environmental emission and material input requirements relative to useful energy outputs of the technologies.

The proposed program emphasizes technologies that can substantially reduce CO_2 emissions. The proposed program also includes expanded support for development of high-flux solar for detoxification of industrial toxic wastes and contaminated ground water.

III. FY 91 Funding Profile

The overall funding levels and strategy involve more than just incremental adjustments in funding allocations between a static set of research efforts - they involve substantial reallocations among three categories of program. Priority programs are proposed for a larger share of total funding in the budget. These technologies, including photovoltaics and bio-alcohol, contribute to solving problems in key energy sectors such as electricity generation and transportation. They have each exhibited enormous technical advances, and attract a high degree of industry involvement and interest which reflects their commercial and technical potential. Core programs are proposed for support at current or reduced levels. They have substantial technical merit and have made significant progress; many including wind and solar thermal, are at the point where federal involvement can be gradually withdrawn and the technology turned over to industry. Reduced/terminated programs include technologies such as solar buildings and ocean thermal programs, with technical merit but which are either substantially complete or have such long-range payoffs that research can be postponed until a future date in favor of efforts with a higher priority.

IV. Strategies

The proposed program pursues the following strategies:

Focused Effort In the mid- to late-70s the program was involved with nearly 100 different technology paths. There has been continued progression, completion, and winnowing of options over the past 10 years. The proposed program is focused on a small number of technologies with the highest potential for success and the greatest likelihood of producing significant amounts of energy in the future, and phases out or delays implementation of options with lesser payoff potentials.

Range of Options in the Short/Mid/Long Term While providing for a more focused R&D effort, the proposed program supports a portfolio of options intended for industry deployment in the short, mid, and long term:

In the short term: bio-methanol and progress on solar thermal waste detoxification.

In the mid term: photovoltaics for peak load applications, solar thermal distributed systems, wind systems, and bio-ethanol.

In the long term: photovoltaics for intermediate and base-load applications, and solar thermal central power systems.

Industry Collaboration The program recognizes that U.S. industrial partners must take the lead in bringing new products to market; thus they are integral players in the design and implementation of each research program. The renewable energy program cost-shares research with industry partners; in FY 1988 the private sector contributed $0.40 for every $1.00 in research contracted by DOE. Where the nature of the research is short range, the program proposes to develop intra-government cooperative efforts to accelerate research progress and deployment, and to leverage program resources. For example, the program works with state and local governments in the support of industrial competitiveness and export opportunities, and with the Department of Commerce and others to assist the deployment of research products to domestic and international markets through the Committee on Renewable Energy Commerce and Trade (CORECT). Where the nature of the research is long term and the payoffs are more uncertain, the program offers specialized facilities and equipment such as those at the Solar Energy Research Institute to conduct collaborative research with industry to support the solar industry in technology and science. Additionally, as in previous years the budget supports the performance of beneficial work for other activities performed on a reimbursable basis including costs associated with the use of facilities and staff resources.

Balanced Research/Development Effort The program's role in collaboration with industry to develop technologies changes as the status of the technology matures. For technologies in the early stages of fundamental research, the program plays a significant role in funding or cofunding innovative concepts in an effort to stimulate industry involvement in long-term research activities that lack economic definition.

For technologies beginning to emerge both in a technical and market perspective, the program's role and funding shift to support private sector efforts on a cost shared basis. The federal portion of the total national effort declines and the industry investment and focus on specific products increases. For more mature technologies, where both products and markets are visualized by industry, the program's role again shifts to primarily one of promoting industry involvement through information programs and technology transfer, or to assist in solving particularly intractable research problems if they are significantly impeding deployment.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

LEAD TABLE

SOLAR ENERGY

Activity	FY 1989	FY 1990 a/	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Solar Buildings Technology						
Operating Expenses	$ 2,305 1/	$ 1,112	$ 1,112 1/	$ 1,000	$ -112	-10%
Capital Equipment	0	148	148	0	-148	100%
Subtotal	$ 2,305	$ 1,260	$ 1,206	$ 1,000	$ -260	-21%
Photovoltaic Energy Systems						
Operating Expenses	$34,346 2/	$33,770	$33,770	$42,800	$ +9,025	+27%
Capital Equipment	800	887	887	800	-82	-9%
Subtotal	$35,146	$34,657	$34,657	$43,600	$ +8,943	+26%
Solar Thermal Energy Technology						
Operating Expenses	$14,512 3/	$14,866	$14,866	$19,350	$ +4478	+30%
Capital Equipment	300	148	148	150	$ +8	+6%
Subtotal	$14,812	$15,014	$15,014	$19,500	$ +4,486	+30%
Biofuels Energy Technology						
Operating Expenses	$13,275 4/	$15,500	$15,500 a/	$27,000	$+11,500	+73%
Capital Equipment	555	789	789	1,000	+211	+27%
Subtotal	$13,830	$16,289	$16,289	$28,000	$+11,711	+72%

LEAD TABLE

SOLAR ENERGY (CONT'D)

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Wind Energy Systems						
Operating Expenses	$ 8,260[5/]	$ 8,930	$ 8,930	$ 8,400	$ -530	-6%
Capital Equipment	500	197	197	200	+3	+2%
Subtotal	$ 8,760	$ 9,127	$ 9,127	$ 8,600	$ -527	-6%
Ocean Energy Systems						
Operating Expenses	$ 4,070[6/]	$ 3,980	$ 3,980	$ 0	$ -3,980	-100%
Capital Equipment	0	99	99	0	-99	-100%
Subtotal	$ 4,070	$ 4,079	$ 4,079	$ 0	$ -4,079	-100%
Solar International Programs						
Operating Expenses	$ 1,000	$ 1,028	$ 1,028	$ 1,500	$ +472	+46%
Subtotal	$ 1,000	$ 1,028	$ 1,028	$ 1,500	$ +472	+46%
Solar Technology Transfer						
Operating Expenses	$ 2,400	$ 1,779	$ 1,779	$ 2,223	$ +444	+25%
Subtotal	$ 2,400	$ 1,779	$ 1,779	$ 2,223	$ +444	+25%
Solar Energy Research Institute						
Capital Equipment	$ 392	$ 475	$ 475	$ 410	$ -65	-14%
Construction Expenses	250	173	173	4,790	+4,617	+100%
Subtotal	$ 642	$ 648	$ 648	$ 5,200	$ +4,552	+702%

LEAD TABLE

SOLAR ENERGY (CONT'D)

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Solar Program Support						
Operating Expenses	$ 970	$ 879	$ 879	$ 900	$ +21	+2%
Subtotal	$ 970	$ 879	$ 879	$ 900	$ +21	+2%
Resource Assessment						
Operating Expenses	$ 709	$ 753	$ 753	$ 950	$ +197	+26%
Capital Equipment	45	0	0	50	+50	+100%
Subtotal	$ 754	$ 753	$ 753	$ 1,000	$ +247	+33%
Solar Program Direction						
Operating Expenses	$ 4,380	$ 4,146	$ 4,146	$ 4,350	$ +204	+5%
Subtotal	$ 4,380	$ 4,146	$ 4,146	$ 4,350	$ +204	+5%
TOTAL	$89,069	$89,659	$89,659	$115,873	$+23,467	+25%
Summary						
Operating Expenses	$86,227	$86,789	$86,789	$108,473	$ 21,684	+20%
Capital Equipment	2,592	2,697	2,697	2,610	-87	-3%
Construction Expenses	250	173	173	4,790	+4,617	+100%
Total Program	$89,069	$89,659	$89,659	$115,873	$+26,214	+25%
Staffing (FTE's)	69	54	54	62		

LEAD TABLE

SOLAR ENERGY (CONT'D)

Authorizations:
- P.L. 93-473, "Solar Energy Research, Development and Demonstration Act"
- P.L. 93-577, "Federal Non-nuclear Energy Research and Development Act of 1974"
- P.L. 95-590, "Solar Photovoltaic Energy Research, Development and Demonstration Act"
- P.L. 95-91, "Department of Energy Organization Act"
- P.L. 96-294, "Energy Security Act"
- P.L. 96-310, "Ocean Thermal Conversion Research, Development and Demonstration Act"
- P.L. 96-345, "Wind Energy Systems Act"
- P.L. 98-370, "Renewable Energy Industry Development Act"
- P.L. 101-218, "Renewable and Energy Efficiency Technology Competitiveness Act of 1989"

1/ Includes FY 1989 SBIR reductions of $60K and reductions of $3,000K integrated with the Conservation R&D Buildings and Community Systems Program.
2/ Includes FY 1989 SBIR reductions of $354K.
3/ Includes FY 1989 SBIR reductions of $188K.
4/ Includes FY 1989 SBIR reductions of $205K and $600K of Hydrogen production research activities transferred from energy storage systems.
5/ Includes FY 1989 SBIR reductions of $79K.
6/ Includes FY 1989 SBIR reductions of $35K.
7/ Includes reductions of $2,846K integrated with the Conservation R&D Buildings and Community Systems Program.
8/ Includes $99K of Hydrogen research activities transferred from Energy Storage Systems.
9/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments P.L. 101-101 general reductions, and P.L. 101-164 reduction to fund anti-drug activities.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Solar Energy

FY 1990 Appropriation	$ 91,859
Adjustments	-2,200
FY 1991 Base	$ 89,659
Solar Buildings Technology	
- Solar Heating Research	-112
- Solar Cooling and Dehumidification (Transfer to Buildings and Community Systems)	0
- Daylighting Research (Transfer to Buildings and Community Systems)	0
- Capital Equipment	-148
Subtotal Solar Buildings	$ -260
Photovoltaic Energy Systems	
- Advanced Thin Film Materials	+2,300
- High Efficiency Materials	-130
- Fundamental Materials Research	-640
- Collector Research	+8,270
- System Research	-770
- Capital Equipment	-87
Subtotal Photovoltaics	$ +8,943

SUMMARY OF CHANGES (CONT.)

Solar Energy

Solar Thermal Energy Systems	
- High Flux Photon Process Research	+462
- Concentrator Research	-1,414
- Electric Systems Research	-200
- Technology Development	+5,636
- Capital Equipment	+2
Subtotal Solar Thermal	$ +4,486
Biofuels Energy Technology	
- Terrestrial Crops	+1,600
- Aquatic Energy Crops	-250
- Thermochemcial Conversion	+6,620
- Biochemical Conversion	+6,729
- Regional Programs	-3,300
- Hydrogen Production Research	+101
- Capital Equipment	+211
Subtotal Biofuels Energy	$+11,711
Wind Energy Systems	
- Atmospheric Fluid Dynamics Research	+142
- Aerodynamics Research	+125
- Structural Dynamics Research	-177
- Advanced Components Research	-540
- Supporting Research	-80
- Capital Equipment	+3
Subtotal Wind Energy	$ -527

SUMMARY OF CHANGES (CONT.)

Solar Energy

Ocean Energy Systems	
- Thermodynamics Research and Analysis	-1,120
- Experimentation Verification and Testing	-2,860
- Capital Equipment	-99
Subtotal Ocean Energy	$ -4,079
Solar International Programs	+472
Solar Technology Transfer	+444
Solar Program Support	+21
Resource Assessment	+247
Solar Energy Research Institute	+4,552
Solar Program Direction	+204
FY 1991 Congressional Budget Request	$ 115,873

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DEPARTMENT OF ENERGY
FY 1981 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

SOLAR ENERGY

I. Preface: Solar Buildings Technology

The goal of the solar buildings technology program is to advance engineering and scientific understanding of solar energy as applied to buildings, and to establish a technology base from which industry can develop economically competitive solar-related products and designs for use in existing and new buildings. Past research has confirmed solar energy can be utilized to supply building energy requirements in a large variety of hot water, space heating, cooling and daylighting applications. The FY 1981 program will integrate solar cooling and daylighting research with the energy efficiency programs funded by the Office of Buildings and Community Systems. These R&D efforts have sufficiently matured so that incorporation into an integrated buildings effort will yield program efficiencies and focus. For FY 1981, research concerning the unique technical challenges of heating through solar technology will be continued. Major emphasis will be placed on research responding to industry's critical needs in solar heating systems, including the development and validation of test procedures required to encourage FHA and private lending institutions in considering solar systems. The research described below is aimed at increasing renewable energy supplied by solar buildings technologies. Industrial cost-sharing of up to $290,000 is anticipated from the non-Federal sector in FY 1981. Major elements of the program are proposed for transfer to the Office of Buildings and Community Systems under conservation in order to provide an integrated research effort in this area.

II. A. Summary Table: Solar Buildings Technology

Program Activity	FY 1980 Actual	FY 1980 Estimate	FY 1981 Request	% Change
Solar Heating Research	$ 1,055	$ 1,112	$ 1,000	- 10
Solar Cooling and Dehumidification Research	0	0	0	0
Daylighting Research	0	0	0	0
Solar Systems Integration	1,250	0	0	0
Capital Equipment	0	148	0	-100
Total, Solar Buildings Technology	$ 2,305	$ 1,260	$ 1,000	- 21

II. B. Major Laboratory and Facility Funding

	FY 1988 Actual	FY 1989 Estimate	FY 1991 Request	% Change
Lawrence Berkeley National Laboratory	$ 800	$ 650	$ 0	-100
Solar Energy Research Institute	$ 2,000	$ 2,000	$ 700	- 65

III. Activity Descriptions: (Row BA in thousands of dollars)

Program Activity	FY 1988	FY 1989	FY 1991
Solar Buildings Technology			
Solar Heating Research	Investigate performance improvements in the use of new aperture materials for active collectors.	Evaluate high transmittance and high thermal resistance collector aperture materials for increased efficiency. Analyze thermochromic optical switching films for mitigating collector stagnation overheat problems.	Conduct research on high transmittance and high thermal resistance collector aperture materials and compound parabolic concentrating (CPC) collection surface materials with increased durability at higher stagnation temperatures.
	Develop an analytical basis for integration of high-performance CPC collectors into advanced high-efficiency absorption cooling systems. Fabricate a prototype array and evaluate performance.		Field test and evaluate year-round performance of a prototype CPC collector array.
	Conduct laboratory tests of prototype vapor phase/multizone thermal transport concepts. Begin development of promising new thermal transport concepts. Evaluate potential improvements to active heating subsystem performance.	Analyze distributed phase change thermal storage materials in solar buildings. Conduct full-scale tests of phase change thermal storage materials in conventional building materials. Complete feasibility study of application of central solar heating plants with seasonal storage for district heating at the University of Massachusetts.	Develop design guidelines for the use of distributed phase change thermal storage materials in solar buildings.

III. Solar Buildings Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Solar Heating Research (Cont'd)	Evaluate potential impact of advanced control strategies on increased subsystems' effectiveness. Investigate the potential for using performance information from building energy management systems in the development of complex but optimum control strategies for solar heating subsystems.	Validate predictive control strategies and knowledge-based control systems. Initiate development of technical guidelines for complex but optimum control strategies for solar heating sub-systems.	Develop prototype of dynamic microprocessor-based control systems for bench testing and evaluation.
	By means of simulation models, evaluate candidate advanced heating subsystem concepts which significantly increase overall effectiveness.	Conduct experimental and analytical research in generic solar heating subsystems and innovative concepts, including solar heating of ventilation air, and active/passive hybrid systems. Develop simulation models for systems using improved components, such as stratified storage tanks and variable flow pumping schemes using the TRNSYS computer code.	Complete research on generic solar domestic hot water systems and validate test procedures required by the solar industry. Complete analytical evaluation of systems with advanced components and configurations. Conduct prototype tests and initiate engineering design of the most promising advanced system concepts.
	Continue testing, evaluation and assessment of heating system materials and components and identify critical state-of-the-art reliability and maintainability issues. Characterize and test candidate concepts that improve reliability and maintainability of technology.	Initiate development of guidelines to improve reliability and maintainability of solar heating subsystems. Monitor and evaluate field performance of systems incorporating guideline recommendations and compare with conventional systems. Evaluate simplified designs for large nonresidential systems.	Complete validation of design, installation and operation/maintenance manuals for large systems installed in nonresidential buildings. Develop advanced active/passive materials and systems to minimize energy consumption.
	Develop algorithms and short-term test procedures for predicting long-term performance of heating components and subsystems.	Validate short-term procedures for predicting long-term performance of generic active solar heating system configurations. Establish methodology for industry use in predicting long-term performance based on short-term tests.	Validate the methodology developed for industry use to predict long-term performance based on short-term tests.
	$ 1,065	$ 1,112	$ 1,000

III. Solar Buildings Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Solar Cooling and Dehumidification Research	Activities made comparable to the FY 1991 request.	Activities made comparable to the FY 1991 request.	To be conducted in Conservation R&D Buildings & Community Systems Program.
	$ 0	$ 0	$ 0
Daylighting Research	Activities made comparable to the FY 1991 request.	Activities made comparable to the FY 1991 request.	To be conducted in Conservation R&D Buildings & Community Systems Program.
	$ 0	$ 0	$ 0
Solar Systems Integration	Complete an experimental study of airflow heat transfer to determine heat transfer rates. Use data to analyze performance of distributed phase change storage materials within solar buildings. Begin development of design tools for distributed storage materials in multizone solar buildings. Complete design guidelines for ventilation cooling in nonresidential solar buildings. Correlate solar diurnal/seasonal energy supply characteristics to the energy needs of key functional space types in buildings. From these, identify required performance characteristics of advanced solar building surface materials. Explore new concepts for integrated advanced aperture/PCM latent storage systems in building modules.	No activities are proposed in this area of solar buildings research; the energy conservation building systems integration program will coordinate with the solar buildings program to ensure daylighting and other solar building technologies are incorporated in the building models and simulations.	Integrated with the Conservation R&D Buildings and Community Systems Program.

III. Solar Buildings Technology (Cont'd):

Program Activity	FY 1988	FY 1990	FY 1991
Solar Systems Integration (Cont'd)	Complete development of vector analysis methodology for determining solar building performance using short-term tests.		
	$ 1,250	$ 0	$ 0
Capital Equipment	No Activities.	Provide overall equipment support to the solar buildings energy systems program.	
	$ 0	$ 140	$ 0
Solar Buildings Technology	$ 2,305	$ 1,280	$ 1,000

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

SOLAR ENERGY

I. Preface: Photovoltaic Energy Systems

The strategy of the FY 1991 photovoltaics program is aimed at linking the technical progress made by research organizations of the last decade to the energy market needs of this decade by providing advanced technology for more cost effective photovoltaic energy systems. The strategy includes continued support of a broad based fundamental and applied research cost shared program involving scientists from university, government and industry laboratories. Research will emphasize single- and multi-junction alternatives across three major material groups: amorphous silicon and alloying elements, high efficiency silicon and gallium arsenide, and advanced thin film II-VI materials. In addition, the strategy calls for a new collaborative effort with the U. S. photovoltaic industry to establish competitive advanced manufacturing capabilities that can reduce to practice the laboratory achievements from the research program. Through this combination of materials and manufacturing research, high performance modules at lower manufacturing costs should become available from U. S. industry in the mid 1990's. It is expected that the FY 1991 program will result in industry cost-sharing of over $15M.

II. A. Summary Table: Photovoltaic Energy Systems

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Advanced Thin Film Materials	$ 15,500	$ 13,200	$ 15,500	+.17
High Efficiency Materials	8,200	7,430	7,300	- 2
Fundamental Materials Research	5,646	7,040	6,400	- 9
Collector Research	3,000	3,730	12,000	+222
System Research	2,000	2,370	1,600	- 32
Capital Equipment	800	887	800	- 10
Total, Photovoltaic Energy Systems	$ 35,146	$ 34,657	$ 43,600	+ 26

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II. B. Major Laboratory and Facility Funding

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Brookhaven National Laboratory	$ 300	$ 300	$ 350	+ 17
Sandia National Laboratories	$ 8,200	$ 9,700	$ 10,000	+ 3
Solar Energy Research Institute	$ 25,000	$ 22,370	$ 25,000	+ 12

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Photovoltaic Energy Systems			
Advanced Thin Film Materials	Cost-shared amorphous silicon industry contracts are continued toward completion in 1990. Conduct in-house laboratory research and supporting university research. Support polycrystalline thin film research at industrial contractors. Initiate industry cost-sharing polycrystalline activity.	Amorphous silicon collaborative industry effort completes its second phase and shifts to several highly targeted efforts aimed at improving cell efficiency. A separate polycrystalline thin film research initiative is added. Modeled after the amorphous silicon industrial cost shared effort, it seeks to build on recent laboratory advances by supporting research to develop cells and modules that contribute towards meeting 15% module efficiency and $50/m² cost and long-term reliability objectives. Both efforts are backed by strong fundamental research teams investigating specific performance, stability, and lifetime problems.	From work initiated in FY 1990, build strong cost-shared research in thin films involving several leading industrial firms and 4-6 different thin film materials. Emphasis on achieving near term cost/efficiency milestones to help ensure meeting long-term goals. Core research in stability, deposition and device characterization is maintained. Primary effort of this activity is to increase the conversion efficiency of both amorphous material devices and polycrystalline thin film devices and to improve the processing of large area material deposition processes which could lead to lower cost structures.
	$ 15,500	$ 13,200	$ 15,500

III. Photovoltaic Energy Systems (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
High Efficiency Materials	Continue in-house research activities. Support promising concentrator cell research and materials work on silicon, GaAs, and multi-junction devices.	Continue in-house research activities to support promising one-sun and concentrator cell research and materials work on silicon, GaAs and multi-junction devices. Perform university/industry research on industry identified problems to improve silicon based materials. Support cost-shared industry research to improve efficiency and reduce complexity of currently available concentrator cells.	The principal objective of this research is to establish for single crystal silicon and other high efficiency materials including gallium arsenide, the knowledge base needed for the continuing industrial development of processes capable of producing flat plate and concentrator modules with cost and performance tradeoffs consistant with long term technical objectives. Building on the efficiency records achieved in FY 1990, university and industrial efforts will emphasize crystal growth and fabrication processes needed for optimized high efficiency cells as well as identify the role of impurities, defects and grain boundaries on the electrical properties of silicon. Special emphasis will be placed on building a strong research effort in ultra-high efficiency devices using multijunction concepts.
	$ 6,200	$ 7,430	$ 7,300
Fundamental Materials Research	Continue in-house measurements and performance activities to support remainder of program. Continue University and New Ideas Program by supporting most promising research. Maintain solid state theory activities.	Fundamental research is concerned with several different activities that cut across the more specific and collaborative research with industry. These activities are performed withio the DOE laboratories and are considered world class efforts: Measurements and Performance, Crystal Growth, Solid State Theory, and Spectral Insolation Resources. Fundamental Research also creates opportunities for new ideas and for three-year non-goal oriented university research.	This activity, which will continue the FY 1990 program, maintains the nation's scientific preeminence in fundamental research. It produces newly trained personnel in university and other research facilities needed as cadre in the developing industrial operations.
	$ 5,648	$ 7,040	$ 6,400

III. Photovoltaic Energy Systems (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Collector Research	Complete key module life testing activities for flat plate systems. Assess new directions. Initiate collaborative research with industry to increase efficiency, extend service life, simplify design, and reduce production costs of concentrator modules.	Begin cost-shared concentrator collector initiative to increase efficiency, extend service life, simplify design, and reduce production costs. Continue reliability and performance testing of new module designs. Conduct preliminary assessment of manufacturing process R&D needs.	Concentrator initiative continues most promising cost-shared industrial efforts emphasizing design approaches and high-efficiency materials. The effort emphasizes technologies which should allow industry to achieve $0.10-$0.15/kWh levelized energy costs by mid 1990's. Recent laboratory fabricated concentrator collectors have been made with greater than 20% conversion efficiency by Sandia. It is expected that the FY 1991 effort will help industrial organizations surpass this critical efficiency level with more production-conscious design approaches. Continue reliability research. Support a $8M research effort on flat plate and concentrator process engineering and manufacturing technology improvements identified by industry as vital for major reductions in manufacturing costs. Identify and target key process/manufacturing steps to achieve major breakthroughs in manufacturing efficiency and utilization of materials and equipment. Utilize competitive solicitations to involve industrial performers in heavily cost-shared (at least 50%) cooperative projects to achieve technology advances. Upgrade user PV test and diagnostic facilities to assist industry in achieving R&D advances. Address critical generic module design, processing and manufacturing issues.
	$ 3,000	$ 3,730	$ 12,000

III. Photovoltaic Energy Systems (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
System Research	Continue evaluation of health and safety issues related to fabrication and operation. Support residential experiment stations. Provide technical assistance to potential PV system users.	Continue Systems Research ongoing efforts to refine the understanding of operating systems and to actively transfer information to potential users. Continue the Data Acquisition and Utilization Task which interfaces with users, provides for up-to-date design practices, assesses the impact of new collector designs on overall systems operations, gathers and reports on long-term performance data for selected PV systems, and provides for technical interface with such application projects as PVUSA. Continue health and safety research. Support regional experiment stations.	Systems research shifts to emphasize the transfer of cost effective systems design information developed from ongoing fielded systems including emerging technology segments at the PVUSA site. Work includes systems studies such as PV system minute time-frame value modeling in a utility grid, and evaluation of prototypical near term small scale systems. Support for health and safety research and system data collection and analysis will also be maintained.
	$ 2,000	$ 2,370	$ 1,600
Capital Equipment	Update measurement facilities.	Modification and repair of critical existing capital equipment.	Update measurements facilities consistent with needs. Target the SERI and Sandia facilities used for both in-house and sub-contractor support of measurement.
	$ 800	$ 887	$ 800
Photovoltaic Energy Systems	$ 35,148	$ 34,657	$ 43,600

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

SOLAR ENERGY

I. Preface: Solar Thermal Energy Technology

The goal of the Solar Thermal Technology program is to establish a technology base from which industry can develop solar thermal power production options for introduction into utility and industrial energy markets. By concentrating the sun's energy, it can be converted into electricity, process heat, or used directly to destroy hazardous chemicals. The solar thermal program is focused on R&D efforts with the goal of 5 cent - 8 cents/kWh in the electric energy market for solar thermal distributed systems in the mid term and for central systems in the long term. The program expands development of high-flux solar detoxification of industrial toxic wastes and contaminated ground water in the short term with the goal of competitive solar thermal waste detoxification in the mid term. The Solar Thermal program conducts research tasks in four major areas: high flux photon processes, concentrators, electric systems, and technology applications. These tasks, which are leveraged by cost-sharing with industrial partners, are designed to achieve improvements in the most promising solar thermal concepts and quickly lead to commercial products. The amount of industrial cost-sharing in FY 1991 is $3.7M.

II. A. Summary Table: Solar Thermal Energy Technology

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
High Flux Photon Process Research	$ 4,325	$ 3,320	$ 3,782	+ 14
Concentrator Research	4,075	4,514	3,100	- 31
Electric Systems Research	3,865	3,700	3,500	- 5
Technology Development	2,247	3,332	8,968	+169
Capital Equipment	300	148	150	+ 1
Total, Solar Thermal Energy Technology	$ 14,812	$ 15,014	$ 19,500	+ 30

II. B. Major Laboratory and Facility Funding

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Sandia National Laboratories	$ 9,280	$ 9,041	$ 10,950	+ 21
Solar Energy Research Institute	$ 4,780	$ 5,273	$ 7,750	+ 47

III. Activity Descriptions: (Raw BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Solar Thermal Energy Technology			
High Flux Photon Process Research	Conduct research and systems analysis to identify opportunities for applying concentrated solar flux for the destruction of toxic chemicals. Emphasize groundwater cleanup and the destruction of dioxins to EPA standards. Conduct dioxin destruction experiments at White Sands Solar Furnace. Initiate lab scale water and trichloroethylene clean up experiments to determine if there is a benefit to using concentrated solar energy as compared to natural sunlight.	Continue research to determine the ability of concentrated solar energy to destroy dilute, but hazardous, organic chemical contaminants in groundwater. Initiate engineering experiments, using parabolic troughs, to determine the effectiveness of concentrated solar energy in destroying trichloroethylene and other pollutants in drinking water. Continue studies to determine waste remediation needs.	Complete engineering experiments in preparations for the water detoxification field experiment (see Technology Development below). Based on a review of DOE and EPA waste problems, conduct lab experiments to determine hazardous chemicals that, in addition to trichloroethylene, can be destroyed by concentrated solar energy.
	Continue basic research on understanding photon-matter interactions which will permit developing methods for increasing the quantum efficiency of the interaction. Initiate use of the molecular beam mass spectrometer (MB-MS) to determine the products of solar chemical destruction. Continue the surface treatment of materials with concentrated solar energy to determine the impact of varying flux, exposure time, and process environment on material properties.	Continue use of MB-MS to develop methods for increasing the quantum efficiency of photons in chemical processes. Initiate a study of photo-catalytic processes that could remove heavy metals from ground water.	Continue basic research leading to increased efficiencies of photon-matter interaction and conduct a lab experiment on removing dilute solutions of heavy metals from water. A study will be initiated on using concentrated flux to remove radionuclides from water.
			Explore, with industry, catalysts other than titanium dioxide for potentially increasing system efficiency of solar water detoxification. Develop a method for mounting and handling the catalyst.

III. Solar Thermal Energy Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
High Flux Photon Process Research (Cont'd)			Conduct lab and field tests using troughs to treat polluted water. Perform system analyses to determine the relative effectiveness of various solar thermal technologies (trough, dish, and central receiver) in destroying hazardous waste.
	$ 4,325	$ 3,329	$ 3,782
Concentrator Research	Test abrasion-resistant polymer coatings for soil prevention and cleaning techniques. Complete evaluation of sol-gel reflector. Complete one year of cleaning tests on heliostats.	Support research on silvered polymers that are durable and less resistant to soiling. Continue outdoor test verification of optical material performance and durability. Continue cleaning tests of heliostats.	Continue evaluating the lifetime of polymer materials exposed to ultra violet energy, and determine effective reflector film replacement techniques. Conduct research to meet the optical, wind loading and structural performance requirements of membrane concentrators.
	Continue design, fabrication, test and evaluation of the stretched membrane dish. Explore the potential of polymers as structural membranes for heliostats and dishes. Using composite materials, construct a model membrane dish for optical evaluation.	Complete fabrication and test of a seven-meter membrane dish reflector element. Complete the design and fabrication of a single-facet stretched membrane dish. Continue the design and fabrication of a multiple-faceted dish.	Evaluate single and multiple-faceted membrane dishes at the Solar Thermal Test Facility (STTF).
	Provide prototype membrane heliostats for the Solar Thermal Test Facility (STTF) in order to conduct optical performance tests. Continue development of semi-automatic concentrator controls. Complete tests of low-cost drive systems.	Continue life testing prototype membrane heliostats. Continue membrane heliostat design, fabrication and tracking optimization.	Continue life testing of prototype membrane heliostats. Develop, in cooperation with industry, the most promising concept for the large-scale membrane prototype heliostat to support electric generation systems.
		Analyze concentrator requirements for advanced applications of concentrated photon-driven processes.	Develop concentrators with enhanced UV reflectivity for detoxification and chemical waste cleanup processes.
	$ 4,075	$ 4,514	$ 3,100

III. Solar Thermal Energy Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Electric Systems Research	Design and evaluate advanced dish subsystems including thermochemical transport systems. Continue investigation of advanced dish system control concepts. Continue test and evaluation of reflux receivers for operation with the STM-120 Stirling engine. Complete conceptual designs of free-piston Stirling engines (FPSEs) developed with NASA. Continue evaluation of the STM-120 engine. Initiate testing of the 10kW Regenerative Thermoelectric Conversion (RTEC) system. Complete test and evaluation of dish Rankine engine modules. Continue STTF testing of advanced dishes and receivers.	Support dish Stirling system analysis and STTF testing of advanced dishes and receivers. Conduct testing and evaluation of reflux receivers for operation with dish-mounted engine. Pursue collaborative efforts with industry for dish FPSE and swashplate Stirling engine development. Support RTEC testing.	Design and evaluate advanced dish subsystems and systems and analyze multiple-module dish systems for remote or central power applications. Complete second generation reflux receiver tests at the STTF. Design and start fabrication of a hybrid (solar/natural gas) reflux receiver. Perform on-sun testing for the kinematic Stirling engine and demonstrate reliability under hybrid operation. Support, with industry, the design of a free-piston Stirling engine that would meet cost and reliability requirements for a utility application.
	Continue design and evaluation of Central Receiver (CR) subsystems and systems. Complete design of the external tube molten salt panel based on the electric utility studies. Design advanced control and plant automation systems. Continue testing of molten salt valves and pumps. Continue thermal cycle testing of cavity molten salt receiver. Continue design and initiate early procurement of a Direct Absorption Receiver (DAR) experiment for a STTF test.	Continue design and evaluation of CR subsystems and systems. Support CR advanced receiver analysis and test. Support CR system design and DAR optimization. Conduct DAR testing and evaluation at the STTF. Conduct phase change salt storage research.	Continue development of advanced central receiver (CR) concepts. Support CR system design and optimization. Identify the most effective receiver type based upon an assessment of DAR, internal film or air receivers, and characterize its performance.
	$ 3,865	$ 3,700	$ 3,500

III. Solar Thermal Energy Technology (Cont'd):

Program Activity	FY 1980	FY 1980	FY 1981
Technology Development	Continue comparative analysis of dish electric systems including: technical alternatives, economic and performance evaluation, and long-term program planning. Terminate the cooperative agreement for the Small Community Experiments. Complete central receiver (CR) utility studies. Evaluate next-generation trough and dish systems, potential photo-chemical systems, and advanced electric applications.	Support program planning, economic and performance evaluations and comparative analysis of concentrating solar systems. Continue evaluation of next-generation trough and dish systems, potential photochemical systems, and advanced electric systems.	Conduct a comparative analysis of concentrating solar systems, including economic and performance evaluations, and perform long-term program planning. Support advanced trough and dish system research and development.
		Assess industry's interest in cost-shared field experiments.	Support industry in the design and fabrication of a 25 kWe dish module for cost-shared field experiments at utility sites to support achievement of near-term dish electric cost and performance goals.
		Develop a method for mounting the catalyst in the solar reactor of a solar water decontamination system. Test mixtures of waste chemicals and actual wastes from potential DOE test sites. Begin market analysis to determine the best applications for high temperature solar detoxification. Coordinate activities with others responsible for waste management and regulation.	Continue design and testing of solar reactor. In cooperation with DOE's Office of Environmental Restoration and Waste Management, complete site selection, system design, and analysis needed for a near-term solar water decontamination field experiment at a DOE waste site. Test mixture of real wastes in high flux detoxification system.
	$ 2,247	$ 3,332	$ 8,988
Capital Equipment	Purchase equipment and instrumentation to support laboratory and field experiments.	Purchase equipment and instrumentation to support laboratory and field experiments.	Purchase equipment and instrumentation to support laboratory and field experiments.
	$ 300	$ 140	$ 150

III. Solar Thermal Energy Technology (Cont'd):

Program Activity	FY 1988	FY 1990	FY 1991
Solar Thermal Energy Technology	$ 14,812	$ 15,014	$ 19,500

DEPARTMENT OF ENERGY
FY 1981 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

SOLAR ENERGY

I. Preface: Biofuels Energy Technology

The development of alternative liquid transportation fuels would make an important contribution to the security, economic well-being and environmental quality of the nation. Therefore, the Biofuels Energy Systems program focuses on the development of innovative and economical processes to produce and convert biomass feedstocks to liquid alcohol fuels. Industry involvement is encouraged in all aspects of program development and execution. Estimated industry cost-sharing is $1,000,000, and includes short rotation feedstock monoculture viability trials and enzyme development. The emphasis of the feedstock production component of the program is on terrestrial energy crops (grasses and trees) grown specifically for energy use. Research emphasizes biotechnology and includes genetic engineering and culture techniques to reduce production costs and maximize fuel production potential. Major improvements in productivity, reductions in production costs, and risks of plant mortality are expected from future physiological, genetic, and bioengineering experiments and are essential to increase widespread feedstock availability for liquid fuel production. Conversion research emphasizes the development of efficient and cost effective alcohol fuels. The two principal alcohols produced from biomass are methanol and ethanol. Fuel alcohol at prices competitive with conventional transportation fuels is the near- to mid-term goal of the program. Municipal solid waste is a valuable source of energy and materials constrained by the lack of self-sufficient data for industry to commercialize new, promising technology and comparative environmental data. Further, biomass feedstocks fix carbon dioxide from the atmosphere as part of their growth and are with municipal solid waste inherently low in the acid gas forming compounds of sulphur, nitrogen and chlorine. Alcohol fuels derived from biomass are oxygenated thereby reducing the ozone and nitrogen oxide emissions associated with gasoline and diesel fuels. Because carbon dioxide is both consumed and produced in the growth, conversion and end-use of biomass energy, the use of biofuels offers a zero net increase in this major greenhouse gas.

II. A. Summary Table: Biofuels Energy Technology

Program Activity	FY 1980 Actual	FY 1980 Estimate	FY 1981 Request	% Change
Terrestrial Crops	$ 3,720	$ 4,400	$ 4,000	- 9
Aquatic Energy Crops	1,000	450	200	- 56
Thermochemical Conversion	1,450	1,900	9,000	+379
Biochemical Conversion	2,130	2,571	10,900	+320
Regional Program	2,000	3,000	500	- 87
Hydrogen Production Research	2,975	2,399	2,500	+ 4
Capital Equipment	555	780	1,000	+ 27
Total, Biofuels Energy Technology	$ 13,830	$ 16,200	$ 28,000	+ 72

II. B. Major Laboratory and Facility Funding

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Argonne National Laboratory	$ 120	$ 0	$ 0	0
Brookhaven National Laboratory	$ 0	$ 95	$ 100	+ 5
Oak Ridge National Laboratory	$ 3,200	$ 3,300	$ 3,500	+ 6
Pacific Northwest Laboratory	$ 120	$ 0	$ 0	0
Solar Energy Research Institute	$ 5,400	$ 8,000	$ 10,000	+125

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Biofuels Energy Technology			
Terrestrial Crops	Modify lead model woody species (Populus) and selected herbaceous feedstocks by biotechnology techniques to increase productivity, stress and disease resistance and energy traits for specific biofuels cycles. Improve nitrogen fixation and nutrient utilization to lower production costs. Continue industry cost-shared monoculture trials to test/validate short rotation. Complete repeated field research (diesel fuel) in Southeast. Continue selecting herbaceous species in Great Plains, Midwest and Southeast and defining agronomic requirements for production systems.	Continue modification of Populus and selected herbaceous feedstocks by genetic and biotechnology techniques to increase national productivity, disease resistance, and energy traits for specific liquid biofuel cycles. Continue industry cost-shared monoculture trials to test/validate short rotation. Complete screening and begin genetics and breeding for selected herbaceous species in Midwest/Lake and Southeast States. Initiate research to modify critical variables such as moisture and lignin content focusing on feedstocks used to produce methanol. Adapt target highly productive grass species that exceed program goals to the Southeast as ethanol feedstocks.	Broaden focus on improving mass per acre and chemical composition of Populus as the principal wood species, including the 4 target regional wood species, Black Locust, Sweet Gum, American Sycamore and Silver Maple, to improve diversity, availability and potential of wood feedstock for conversion to methanol. Focus on 6 herbaceous model species for conversion to liquid transportation fuels. This effort will be supported by generic research to develop advanced generation biomass feedstocks by the U.S. Department of Agriculture under an interdepartmental memorandum of understanding. Physiological knowledge coupled with genetic terrestrial feedstock improvements will make biofuels economically competitive. Expand industry cost-shared short rotation wood viability trials. Develop more efficient nitrogen fertilizer regimes and root organisms to make trees more efficient nitrogen collectors. Plant characteristics that affect conversion processes have been

III. Biofuels Energy Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Terrestrial Crops (Cont'd)			identified and will be modified by applying advanced biotechnology techniques. Initiate research to reduce storage and preparation costs for target terrestrial energy crops for conversion to bioethanol. These efforts are necessary to achieving program goal of 10 tons/acre/year.
	$ 3,720	$ 4,406	$ 4,000
Aquatic Energy Crops	Continue operation of outdoor test facility to evaluate and improve the performance of laboratory selected strains and address engineering issues associated with outdoor mass culture. Conduct research to develop and improve processing and conversion of microalgae oils. Complete physiological and lipid characterizations of collected strains and select best 6-10 strains for genetic improvement. Initiate classical and advanced genetic techniques to improve lipid production.	Conclude operation of outdoor test facility. Complete evaluation of engineering design issues such as lined vs unlined ponds, hydrodynamics, evaporation, and percolation. Apply advanced genetic engineering and related laboratory techniques to improve lipid production and fuel quality.	Maintain aquatic microalgae organism data bank. Lower priority of longer term aquatic species research will allow greater focus on nearer-term alcohol fuels.
	$ 1,000	$ 450	$ 200
Thermochemical Conversion	Data collection for heat transfer models will be completed. Experimental research on trace chlorinated emissions will continue. These efforts provide a data base for improved Energy from Municipal Waste (EfW) technology and economics. Continue research on hydrotreating of heavy-end biocrude oils. Continue gasification research on steady-state experiments with high-moisture feedstock to methane.	Begin small scale gasification experiments to address the major research issues facing methanol production from biomass. These include gas clean-up, gas compression, and modification of hydrogen: CO ratio systems. Initiate cost shared binder enhanced densified refuse derived fuels (dRDF) combustion tests in a utility boiler with industry including associated environmental data collection. Initiate collection of energy cost and environmental data on various MSW utilization strategies	Conduct laboratory scale gasification experiments to address the issues facing methanol production from biomass focusing on methanol synthesis gas conditioning. Develop an understanding of compression, modification of hydrogen to CO ratio, and methanol synthesis systems. Add herbaceous feedstocks to wood gasification experiments. Expand catalytic research for improved transportation fuel yields. Start research on environmental aspects of biomass conversion to transportation fuel.

III. Biofuels Energy Technology (Cont'd):

Program Activity	FY 1990	FY 1990	FY 1991
Thermochemical Conversion (Cont'd)		including combustion recycling and landfill. Identify data gaps.	Design and begin procurement of a process development scale gas clean-up system to be added to the centerpiece medium-Btu gasification facility. These efforts are necessary to achieve technical and economic competitiveness for methanol technology to be transferred to industry in FY 1995. Continue RDF combustion test. Test novel approaches to MSW combustion effluent gas cleanup and residue stabilization for heavy metals. Begin cost shared research to fill data gaps and continue to gather comparative energy cost and environmental data for MSW processes.
	$ 1,450	$ 1,800	$ 9,000
Biochemical Conversion	Continue research to improve reaction rates, increase yields and establish anaerobic digestion reactor stability and control. Develop monoclonal antibody probes tracking specific organisms within an anaerobic digester. Continue research on genetic techniques to produce tolerant anaerobes for increased methane production. In cellulosic hydrolysis for alcohol production, only enzymatic approaches will be investigated with emphasis on simultaneous saccharification and fermentation (SSF). Research will also be conducted to understand and improve pretreatment and to produce better quality enzymes more rapidly. Phase-out of acid hydrolysis will be completed. Simultaneous isomerization and fermentation (SFIX) will be investigated as a means of utilizing the xylose fraction of biomass. Lignin research will be limited to	In the enzymatic hydrolysis and fermentation of the cellulosic fraction of biomass to ethanol, research will focus on the simultaneous saccharification and fermentation (SSF) process. Complete applied pretreatment research, and focus effort on fundamental understanding of the pretreatment process. Genetic engineering techniques will be used to better understand and improve the hydrolysis process, and improved enzyme production methods will be developed. Develop continuous process (improve simultaneous fermentation and isomerization of xylose) for the fermentation of xylose to ethanol to improve process economics. Cost share with corn-based ethanol industry. Investigation of the conversion of corn kernel processing wastes to ethanol. Investigate potential for waste paper as an SSF feedstock. Begin design of a	Perform research to improve the pretreatment step separating biomass into cellulose and hemicellulose. Improve definition of the costs associated with enzyme production (i.e. oxygen transfer, mixing, reactor design). Genetically improve yeasts for cheaper enzyme production. Develop mutants with new methods of enzyme expression. Conduct gene mapping studies in order to better understand and control the regulation of cellulase production. Develop mutants that can produce cellulase enzymes on a non-cellulose source. Work with industry on understanding the method by which cellulase attacks crystalline cellulose. Continue collaboration with corn-based ethanol industry to investigate conversion of corn fiber wastes to ethanol. Investigate enzyme stabilization, recovery and recycle as means of conserving all the enzymes in

III. Biofuels Energy Technology (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Biochemical Conversion (Cont'd)	organosolvent preparation.	process development unit integrating pretreatment and SSF steps. Investigate biogas as a feedstock for methanol synthesis. Issue cost shared competitive solicitation for anaerobic digestion of municipal solid waste demonstration unit.	the conversion process. Apply genetic engineering to improve yeasts ability to ferment xylose. Experiment with low-lignin feedstocks that are under development at ORNL. The simultaneous saccharification and fermentation research will conduct experiments to improve the match between saccharification enzymes and fermentation yeasts. Continue optimization of simultaneous fermentation and isomerization of xylose utilizing enzyme immobilization. Initiate efforts to work with industry to develop new process technology for alcohol fuels. These efforts are necessary to achieve technical and economic competitiveness for ethanol technology to be transferred to industry in 2010. Continue cost shared competitive anaerobic digestion demonstration of municipal solid waste producing energy.
	$ 2,130	$ 2,571	$ 10,800
Regional Program	Program will continue to transfer biofuels technology efforts.	Continue technology transfer tailored to specific regions of the country.	Provide data on municipal solid waste developed under the thermochemical and biochemical programs.
	$ 2,000	$ 3,600	$ 500
Hydrogen Production Research	Conduct research on production of hydrogen by microalgae. Investigate multi-layer photochemical cells and novel thin film photoelectrodes that can achieve high efficiencies and develop sufficient voltage to split water to form hydrogen. Evaluate selected hydrogenase-catalyzed and nitrogenase-catalyzed biological systems for applicability to hydrogen producing systems. Continue research on hydrogen production methods including	Continue research on multilayer photochemical cells. Perform research on the conversion of high moisture biomass to produce hydrogen. Develop a hydrogen absorption model for the storage of hydrogen on activated carbon and verify with experimental data. Continue research on selected cyano bacteria to improve their hydrogen producing activity using genetic manipulation. Continue research with emphasis on steam electrolysis and	Conduct research to complete electrochemical characterization of photoelectrodes that can achieve high efficiencies and split water to form hydrogen. Continue research on production of hydrogen by microalgae. Evaluate and optimize new carbon materials for incorporation into a scaled-up Process Development Unit for hydrogen storage. Issue competitive solicitation.

III. Biofuels Energy Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Hydrogen Production Research (Cont'd)	materials for advanced electrolysis.	hydrogen absorption on activated carbons.	
	$ 2,975	$ 2,399	$ 2,500
Capital Equipment	Laboratory apparatus for biofuels production and conversion.	Upgrade/replace obsolete laboratory equipment.	Laboratory apparatus for biofuels production and conversion. Upgrade/replace obsolete laboratory equipment.
	$ 555	$ 789	$ 1,000
Biofuels Energy Technology	$ 13,830	$ 16,288	$ 28,000

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

SOLAR ENERGY

I. Preface: Wind Energy Systems

Field operational experience accumulated on commercial wind machines over the past five years has made it evident that major structural and fatigue problems remain to be resolved and performance needs to be improved for the technology to be cost-effective in broad U.S. and overseas markets. Results to date also show that there is significant opportunity for major advances in energy capture and reductions in weight and cost of wind turbines. Consequently the FY 1991 Wind Energy Program has been structured to achieve three objectives: 1) improve understanding of fundamental sources of wind variability; 2) increase basic understanding of interactions between wind inputs and wind turbine structural response; and 3) investigate through generic proof-of-concept activities, the potential for improved performance using advanced components and subsystems. By working with industry, the wind program can accelerate its basic science research in the fundamental processes that are critical to achieving the needed advances. Technology transfer activities and close coordination with industry remain as key strategic elements in the research program. Industry is expected to add a 40 cent cost share to each federal dollar received under contract.

II. A. Summary Table: Wind Energy Systems

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Atmospheric Fluid Dynamics Research	$ 1,000	$ 908	$ 1,050	+ 16
Aerodynamics Research	2,300	2,275	2,400	+ 5
Structural Dynamics Research	3,290	2,977	2,800	- 6
Advanced Components Research	1,500	1,840	1,300	- 29
Supporting Research	250	930	850	- 9
Capital Equipment	500	197	200	+ 2
Total, Wind Energy Systems	$ 8,760	$ 9,127	$ 8,600	- 6

II. B. Major Laboratory and Facility Funding

	FY 1980 Actual	FY 1980 Estimate	FY 1981 Request	% Change
Pacific Northwest Laboratory	$ 900	$ 700	$ 700	0
Sandia National Laboratories	$ 2,275	$ 1,850	$ 1,800	- 3
Solar Energy Research Institute	$ 5,084	$ 5,921	$ 5,800	- 2

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1980	FY 1980	FY 1981
Wind Energy Systems			
Atmospheric Fluid Dynamics Research	Turbulence is the principal source of fatigue loads and resulting stresses for any size wind turbine. Field evidence suggests that different scales of turbulence affect various turbines differently. FY 1980 projects relate to establishing significant turbulence predictive capability useful to machine designers.	A complete description of the turbulence impacting a rotor disk requires knowledge of the vertical stability, length of turbulent eddies in the mean wind direction, mean wind speed, and correlation of the eddies across the disk. Proposed activities include analyses and field tests at several sites with representative characteristics that designers could use to characterize specific sites.	Complete development and conduct testing of methods to allow windfarm developers and wind turbine manufacturers to characterize turbulence at an arbitrary site. Two methods are being pursued: a simple method based on single towers at multiple sites and inexpensive instrumentation provided by PNL that will be suitable for wind farm planning and a more detailed method being developed by SERI using anemometer arrays and more extensive instrumentation that will be suitable for research purposes. The SERI method is being applied at a windfarm where 7.5 meter airfoils will be tested in San Gorgonio Pass. Particular attention will be given to turbulence within the windfarm because turbine damage is more severe deep within the array.

III. Wind Energy Systems (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Atmospheric Fluid Dynamics Research (Cont'd)	Recent analysis of windfarm performance data indicate that array performance losses due to wakes and micrositing result in 10 to 30% lost energy. Thus the area of wakes and performance remains an important element of the program. Planned FY 1989 activities build upon previous work in the cooperative research program, federal research, and international activities to produce a validated micrositing tool to account for wake losses, wake turbulence, terrain-influence on flow, and climatology.	The existing micrositing models will be enhanced to improve the predictive capability for wind direction. Analyses of windfarm data have also demonstrated that the input turbulence and flow variations have significant spatial and temporal coherence, in that large eddies can be observed impacting the turbine and even the entire array on a periodic basis. The relatively new academic discipline of "chaos theory" will be applied to these phenomena to develop a better understanding of array and turbine performance and control.	Based on research at PNL and through two SBIR contracts, the limitations in existing micrositing models have been determined and potential improvements identified. These improvements will be incorporated in the models and they will be evaluated against real windfarm data. In addition, the eddies analysis and chaos theory techniques will be applied to windfarm data to identify the typical scales of eddies that affect turbine stress and performance. What is learned should make a significant contribution to windfarm design optimization.
	$ 1,000	$ 900	$ 1,050
Aerodynamics Research	FY 1989 activities extend our knowledge of aerodynamic phenomenology through laboratory and field studies using the latest aerospace sensing technology.	Completion of analysis of blade pressure data from the Combined Experiment which characterizes the effect of a mass of air as it passes through the area swept by the rotor, and other test turbines should provide considerable insight into the behavior of a wind turbine rotor operating in and out of stall. This should permit design of a "deep stall" experiment to investigate how to take advantage of the dominant properties of stall. Experiments will also be conducted in wind tunnels and in the field with liquid crystals and other flow visualization techniques to better understand the unsteady physics.	Data from the multiple-chord pressure measurements from the combined experiment will be analyzed to identify the operative unsteady aerodynamics on this scale turbine. Preliminary data show that dynamic stall does occur but is different from helicopter experience or that observed in the wind tunnel. Unsteady experiments using liquid crystal and other sensors will also be continued. From all of these experiments a model of dynamic stall will be developed that will be tested on an industry-scale wind turbine in the deep stall experiment. In FY 1991 tests will be conducted to explore the full range of advanced, stall-controlled rotors which contain the most promising industry advanced concepts using the multiple-chord blade pressure measurements developed for the combined experiment. This work contributes to increased energy capture.

III. Wind Energy Systems (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Aerodynamics Research (Cont'd)	The results of the unsteady aerodynamics research, as well as observed problems with field data, will also be used to improve aerodynamics computer codes. The third area, cooperative research, is the principal external research vehicle for the program and was continued. High priority is placed on taking advantage of windfarm data to expedite improved understanding of key processes and problems.	Aerodynamic predictive computer codes for certain types of machines will be revised to reflect the resulting improved understanding of unsteady aerodynamics, including yaw behavior. Cooperative research with industry has proven to be positive for both the Federal research program as well as private industry. It has provided rich and varied research data sets for wakes, aerodynamic performance, and structural response to turbulence loads for the Federal research program, and provided feedback and validation of design choices for industry. For example the benefits of a teetered rotor compared to a rigid hub rotor have been published in several technical papers, and recent data confirm the performance of an innovative rotor for one participant. Cost-shared conceptual designs by industry of advanced turbine systems will be undertaken in FY 1990.	Modification to codes for aerodynamic performance (energy capture) and processes would be initiated to include dynamic stall and three dimensional (span-wise) flow. Cooperative research will continue conceptual design studies of advanced wind turbine concepts awarded in FY 1990. The objective of this effort is to identify high potential system and sub-system designs and to provide design trade-off information to Federal researchers to assist in program planning.
	$ 2,300	$ 2,275	$ 2,400
Structural Dynamics Research	In addition, research tests on several industry turbines was continued to establish the correlation of wind turbulence with blade pressures and resulting structural stresses in order to identify both the phasing of the fatigue-damaging loads and significant parameters in the windflow that result in damage. Research was also continued from FY 1988 on a single, more heavily instrumented turbine in the combined experiment. The resulting data sets from both efforts will be very useful in Federal research and will be made available to the industry.	Structural response data from the cooperative research program, the combined experiment, the 34-meter test bed and other industrial turbines will be collected and analyzed to validate structural models and to establish relevant parameters in the inflow that contribute to stress and damage. This data will also be used to develop improved models of yaw dynamics, drive train response and variable speed operation. Poor yaw dynamics are now believed to cause significantly higher loads than anticipated and appear to be a major cause of problems in windfarms.	Fatigue damage is driven by the stress time history of any wind turbine. Structural response data from test beds, the combined experiment, industry turbines and other sources will be collected and analyzed in order to improve models and to characterize the external conditions (e.g., high shear) that damage turbines. Accurate stress history projections can only be provided by improved, time-domain models that properly reflect the turbulent wind inflow, the unsteady aerodynamic processes, the response of the control system and different

III. Wind Energy Systems (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Structural Dynamics Research (Cont'd)			turbine configurations. Development of such models is a multi-year effort and will continue from FY 1990.
	FY 1989 activities include a balanced program of laboratory testing to establish materials properties, field testing to document fatigue damage and limited full-scale joint testing with industry.	The fatigue properties of blade materials, especially fiberglass, are not well understood and vary considerably depending on manufacturing techniques. The fatigue research effort involves (1) establishing the fundamental materials properties through testing at universities and commercial laboratories, (2) sub-scale and full-scale testing of components such as blades and hubs, (3) field testing to track stress history and failure modes, and (4) development of computer codes that can be used by industry to predict the lifetime of components.	A major fatigue testing capability suitable for Federal and industry wind research will be completed at SERI in FY 1991. This facility would permit SERI and industry to evaluate blade attachment designs for advanced airfoils, a capability that is presently lacking in the industry. In addition, fatigue models and damage rules developed previously will be evaluated against field and experimental data to identify promising approaches and to assist in conceptual designs of advanced components. The impact of various control algorithms on fatigue damage will also be investigated. Fatigue characterization of wind turbine materials will be continued under contract to industry and universities. The FY 1991 structural dynamics activities contribute to extension of turbine life and new, lighter weight designs.
	$ 3,200	$ 2,977	$ 2,800

III. Wind Energy Systems (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Advanced Components Research	Efforts on proof-of-concept technology development in airfoils and variable speed wind turbine systems was continued. Payoffs are already seen in first generation airfoils for horizontal and vertical axis systems that demonstrate improved energy capture, reduced susceptibility to bug and dirt fouling, easier fabrication, and possibly reduced loads. It is anticipated that virtually all 10 to 15 meter rotor Danish turbines, whose initial fiberglass blades have delaminated (of which there may be thousands), could be retrofitted by U.S. manufacturers with improved airfoils. Other benefits pursued include improved post-stall characteristics.	Airfoils developed under the Federal program have been enthusiastically received by industry because of increased energy capture, controlled stall characteristics, and reduced sensitivity to fouling by dust or salt. Atmospheric testing of several airfoil families designed for the replacement blade market will be completed in FY 1990 and new designs will be initiated.	Data from atmospheric testing of previously developed airfoils will be analyzed to determine whether the control of peak power, reduced sensitivity to fouling, and other design properties, were in fact achieved. Based on these results, variations in existing designs and/or new designs will be undertaken.
	The objectives of the efforts in variable speed wind systems are to evaluate the benefits and costs of this advanced concept. The variable speed technology promises improved energy production, potential reduction in structural loads and tailoring the turbine to the characteristics at a site. These potential improvements have costs in required equipment and control complexity. Industry is looking to the Federal program to scope out both costs and benefits, prior to any firm's committing resources.	Industry has demonstrated keen interest in the potential benefits of variable rotor speed operation of wind turbines. The Med-5 has shown the feasibility of variable speed operation in general. The Federal program will work with industry to establish its cost-effectiveness for intermediate size turbine technology.	Continue to work with industry to characterize the benefits and costs of variable rotor speed wind turbine operation. Proposed projects include in-house research on variable speed systems, design tradeoff studies and industry liaison.

III. Wind Energy Systems (Cont'd):

Program Activity	FY 1988	FY 1990	FY 1991
Advanced Components Research (Cont'd)		The wind industry is now beginning to design second generation technology, using a variety of generally accepted configurations such as teetered hubs for upwind horizontal axis turbines. A number of advanced features such as uniquely hinged rotors, variable speed generators, and innovative array control systems will be designed and tested. This activity will initiate a number of studies to identify the economic costs and benefits, aerodynamic and structural implications, as well as control system impacts of such advanced configurations. Industry will participate in scoping the studies.	The design of any wind turbine is a true systems problem. Individual subsystems interact with one another, and conservatism in one subsystem, e.g., the rotor, affects the design of others. Relatively few conceptual design system studies have been performed in the Federal wind program, except for those associated with the turbine development programs. Proposed FY 1991 efforts would continue internal laboratory tradeoff studies in parallel with the cooperative conceptual studies undertaken by industry.
	$ 1,500	$ 1,840	$ 1,300
Supporting Research	The supporting research includes activities that relate to attainment of goals in the multi-year plan but do not appear explicitly in another category. Planned activities in FY 1988 would continue characterization of wind/hybrid power systems.	Activities include continuation of planning and technology assessments, and electrical system impacts of wind turbines and arrays. Wind/hybrid interface issues will be investigated and control scenarios generated.	Proposed activities include planning and technology assessments, electrical system impacts and wind/diesel/hybrid system characterizations.
	$ 250	$ 930	$ 850
Capital Equipment	Data acquisition equipment would be acquired to support cooperative research tests with industry and at SERI.	Several sonic anemometers and related support equipment would be acquired to support SERI research.	Update data acquisition equipment to support cooperative research and the "deep stall" experiment.
	$ 500	$ 197	$ 200
Wind Energy Systems	$ 8,760	$ 9,127	$ 8,600

DEPARTMENT OF ENERGY
FY 1981 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

SOLAR ENERGY

I. Preface: Ocean Energy Systems

The objective of the ocean energy program is to develop a generic technical data base and reduce the technical risks associated with the extraction and use of ocean derived energy sources to the point that allows industry to judge where and when the technology could be commercialized. DOE has supported R&D required to develop a generic set of experimentally verified predictive models for industry's use. This approach has furnished industry with a data base that can assist in the commercialization of the ocean technologies, while making additional options available to decision makers in their formulation of a balanced energy supply. With the completion of design activities for a 165 kWe open-cycle OTEC experiment and the validation of analytical models using seawater, DOE will complete close-out activities to be initiated in FY 1980. Continued support for additional activity is not proposed on the basis of cost and potential benefit as compared to those where commerical development can be more rapid and substantial.

II. A. Summary Table: Ocean Energy Systems

Program Activity	FY 1980 Actual	FY 1980 Estimate	FY 1981 Request	% Change
Thermodynamics Research and Analysis	$ 2,183	$ 1,120	$ 0	-100
Materials and Structures Research	430	0	0	0
Experimental Verification and Testing	1,537	2,860	0	-100
Capital Equipment	0	99	0	-100
Total, Ocean Energy Systems	$ 4,070	$ 4,079	$ 0	-100

II. B. Major Laboratory and Facility Funding

	FY 1980 Actual	FY 1980 Estimate	FY 1981 Request	% Change
Argonne National Laboratory	$ 500	$ 250	$ 0	-100
Solar Energy Research Institute	$ 3,266	$ 3,251	$ 0	-100

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Ocean Energy Systems			
Thermodynamics Research and Analysis	Implement component and system performance models for analyzing OC-OTEC experiments; evaluate designs and scaling requirements for proposed open-cycle component and system-level tests.	Provide analytical support for design and performance prediction activities for the 165 kWe OC-OTEC experiment.	Complete close-out activities.
	Develop a performance specification and a conceptual design of a turbine test article to be used in the open-cycle system experiment. Implement system performance models to generate apparatus designs for heat and mass transfer test hardware and plans for experiments relevant to a system-level open-cycle experiment. Develop a conceptual design of an experimental open-cycle turbine converter and test article. Develop and validate analytical models that predict performance of open-cycle evaporators, direct-contact condensers, and sorption processes. Develop and validate analytical models of surface condensers appropriate for open-cycle applications.	Complete validation of OC-OTEC analytical models and prepare documentation for industry's use.	
	Implement component and system performance models for analyzing hybrid systems; evaluate performance and cost projections for the concept.		

III. Ocean Energy Systems (Cont'd):

Program Activity	FY 1988	FY 1990	FY 1991
Thermodynamics Research and Analysis (Cont'd)	Assess conceptual designs for scalable open-cycle conversion systems in order to formulate corresponding performance equations and cost algorithms; implement research on system cost/performance models. Analyze advanced concepts as alternatives to the open-cycle system for small shore-based applications. Universities will perform fundamental research on selected topics relevant to OC-OTEC.		
	$ 2,183	$ 1,120	$ 0
Materials and Structures Research	Expose OTEC plant materials to the ocean environment at the Seacoast Test Facility. Develop engineering correlations by organizing data on fouling, corrosion and erosion of open-cycle turbine and heat exchangers materials. Initiate investigation of optional cold-water pipe materials.	No activities planned.	No activities planned.
	$ 430	$ 0	$ 0
Experimental Verification and Testing	Perform seawater experiments on key open-cycle components, including flash evaporator, direct-contact and surface condensers, mist eliminator, and on sorption processes. Perform system-level tests of OC-OTEC power system to investigate interrelated heat and mass transfer processes and determine performance characteristics. Determine response of a previously installed CWP to ocean environment.	Complete testing of heat and mass transfer processes using seawater at the Natural Energy Laboratory of Hawaii, and initiate an orderly close-out of the program.	Complete close-out activities.

III. Ocean Energy Systems (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Experimental Verification and Testing (Cont'd)	Accelerate design activities on the 165 kWe turbine and the Heat and Mass Transfer Experimental Apparatus (HMTEA) sub-systems.		
	$ 1,537	$ 2,860	$ 0
Capital Equipment	No Activities.	Modify equipment for completion and close-out of testing.	No activities planned.
	$ 0	$ 80	$ 0
Ocean Energy Systems	$ 4,070	$ 4,079	$ 0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

SOLAR ENERGY

I. Preface: Solar International Programs

The mission of the solar international program effort is to facilitate the use of U.S. renewable energy products and services. In its support of the Committee on Renewable Energy Commerce and Trade (CORECT) it brings together potential users, decision makers, funding sources and U.S. industry to ensure that U.S. renewable energy technologies are considered for viable applications in the highly competitive world marketplace.

II. A. Summary Table: Solar International Programs

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Solar International Programs	$ 1,000	$ 1,028	$ 1,500	+ 46
Total, Solar International Programs	$ 1,000	$ 1,028	$ 1,500	+ 46

II. B. Major Laboratory and Facility Funding

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Idaho National Engineering Laboratory - EG&G	$ 50	$ 99	$ 100	+ 1
Oak Ridge National Laboratory	$ 0	$ 50	$ 100	+100
Sandia National Laboratories	$ 100	$ 200	$ 400	+100
Solar Energy Research Institute	$ 300	$ 240	$ 400	+ 67

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Solar International Programs			
Solar International Programs	Support technical competitiveness activities for individual technologies. Emphasize private power initiatives, design guides, sizing assistance, and technical training missions. Address financing problem by supporting education program for bankers/financiers. Support interactive training/networking/collaboration with AID, World Bank, and others. Focus on utility management and energy planners of countries with growing energy needs.	Continue technical competitiveness activities for individual technologies. Support technology competitive assessments and education efforts aimed at world financial community. Assist in establishing export and referral services. Continue work on private power initiative, design guides and technical training missions.	Provides basic support of U.S. renewable energy industry export activities including design assistance, decision maker education, and market development including technical trade missions. These activities are cost shared with industry and other federal CORECT members. Assistance also includes cost shared feasibility efforts with emphasis on Pacific Rim countries, financing workshops specially tailored for private investment and broad education of multilateral and bilateral assistance agencies. Provides for improved trade data collection and analysis. This level also provides for an improved international data base together with appropriate information products.
	$ 1,000	$ 1,028	$ 1,500
Solar International Programs	$ 1,000	$ 1,028	$ 1,500

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

SOLAR ENERGY

roface: Solar Technology Transfer

objective of the program is to provide technical and public information services and to provide support for key technology transfer projects. viding credible, current information on renewable energy technologies to end users and other decision-makers is vital for the expanded use of se technologies. As a centralized, efficient means of technology transfer, the program funds the Solar Technical Information Program at SERI develop documents and exhibits and to answer technical inquiries on renewable energy from researchers and industry. In addition, the program vides information to the general public, students, and others through a nationwide automated inquiry service.

FY1991, the program will include funding to support a few researchers from DOE laboratories to perform sabbaticals in industry or universities order to expand the first-hand exchange of information on renewable energy research. Concurrently, the program will attempt to identify the t methods for evaluating the effectiveness of various technology transfer mechanisms which are useful for renewable energy technologies, in ler to maximize future technology transfer efforts.

. Summary Table: Solar Technology Transfer

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Solar Technology Transfer	$ 2,400	$ 1,779	$ 2,223	+ 25
Total, Solar Technology Transfer	$ 2,400	$ 1,779	$ 2,223	+ 25

. Major Laboratory and Facility Funding

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Solar Energy Research Institute	$ 1,300	$ 1,200	$ 1,275	+ 6

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Solar Technology Transfer			
Solar Technology Transfer	Development/production of various textbooks, technical guides, technical case studies and technical articles reflecting the latest state-of-the-art developments in solar research. Continue nationwide public inquiry service for conservation and renewables. $ 2,400	Maintain development and production of key technical information products. Continue operation of public inquiry capability. $ 1,779	Maintain development and production of key technical information. Complete existing contractual obligations for public inquiry service. Initiate experiment with laboratory sabbaticals and technology transfer effectiveness study. $ 2,223
Solar Technology Transfer	$ 2,400	$ 1,779	$ 2,223

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

SOLAR ENERGY

I. Preface: Solar Energy Research Institute

SERI is the primary laboratory carrying out Solar Research and Development. Ongoing maintenance and upgrading of the Institute's general and scientific equipment and facilities is necessary to maintain the integrity, viability, and excellence of the research mission. SERI equipment and construction funds are directly related to the accomplishment of Department goals: providing the facilities and equipment to develop competitive solar energy supply options; enhancing U.S. industrial competitiveness through partnerships with industry, using SERI's state of the art capabilities; and developing renewable technologies that improve environmental quality. To accomplish these goals, in FY 1991 work will begin on a badly needed Solar Energy Research Facility to replace inadequate and marginally safe leased facilities, for the conduct of solar electric research including photovoltaics and related materials sciences. The new facility will allow personnel health and safety requirements to be met in the future - transportation of hazardous materials will be allowed with minimum risk and the toxic fume ventilation system will assure safety. Evolving and expanding R&D requirements will be accomodated, including the ability to expand lab space and install larger equipment, inclusion of building services such as HVAC, electrical, water, and sewer that can support research, and floor slabs that can reduce vibration to allow critical optical measurements.

II. A. Summary Table: Solar Energy Research Institute

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
General Purpose Equipment	$ 392	$ 475	$ 410	- 14
General Plant Projects	250	173	290	+ 68
Construct SERI Facility	0	0	4,500	+100
Total, Solar Energy Research Institute	$ 642	$ 648	$ 5,200	+702

26-657 O—90——15

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Solar Energy Research Institute			
General Purpose Equipment	Acquisition of replacement administration support, mainframe tape subsystem equipment, and machine shop equipment.	Acquire Fourier Transform Infrared (FTIR) Spectro-photometer for advanced materials analysis, micro-balance apparatus, and data communications link, file server, and disk drives for mainframe computer.	Acquisition of Scanning Tunneling / Atomic Force Microscope, administrative support equipment, additional LAN file servers, and upgrade of toxic gas monitoring system for personnel safety.
	$ 382	$ 475	$ 410
General Plant Projects	Modifications to existing facilities for repair and refurbishment, and to add five wet, analytical laboratories.	Modifications to existing facilities for repair and refurbishment, and for ventilation system retrofits.	Modifications to existing facilities for repair and refurbishment, and begin repair of deteriorated toxic fume hoods.
	$ 250	$ 173	$ 290
Construct SERI Facility	No Activities.	No Activities.	Complete Title I/II Design of Solar Energy Research Facility and begin construction. Complete site work and building foundation.
	$ 0	$ 0	$ 4,500
Solar Energy Research Institute	$ 642	$ 648	$ 5,200

Solar Energy Research Institute

GENERAL PLANT PROJECTS (GPP)

A total of $290,000 is requested for general purpose repair and refurbishment of the facilities at the Solar Energy Research Institute. The following general plant projects are proposed:

- General Repair Projects for the SERI Permanent Site This addresses multiple projects too sizeable to be funded with operating funds, and includes repair or replacement of deteriorated roofs, sidings, and other exterior items as well as interior floors, ceilings, and interior finishes. Also included are repairs on fences, roads, sidewalks, and drains. The repairs/retrofits accomplished with this funding will keep operational the DOE facilities for which SERI is responsible and will help avoid negative impacts on program milestones or overall SERI mission.

- Building 16 Ducting Replacement This project will begin the process of removing deteriorated toxic fume hood ducting in Building 16, and replacement with PVC-lined metal ducting. In addition, for these ducts the existing hood exhaust fans (located at the hoods) will be replaced with corrosion resistant fans located at the building boundary; the toxic ductwork will thus operate at negative pressure relative to the building ventilation envelope, preventing safety problems if corrosion occurs. The existing ductwork in many places will not assure safe operation with toxic materials in the future; replacement is necessary regardless of the possible movement of toxic experiments to a new facility in the outyears. Only necessary repairs to ensure that no life safety problems occur, will be accomplished in the leased building. (Partial funding)

Solar Energy Research Institute

GENERAL PURPOSE EQUIPMENT (GPE)

A total of $410,000 is requested for general purpose scientific and computing equipment at the Solar Energy Research Institute. The following general purpose equipment projects are proposed:

- Administrative and Computer Equipment - local area network file servers and high capacity printers. In FY 1989, the Institute began a transition from using a mainframe computer for administrative computing with dedicated word processors for office automation, to using personal computer (PC) based local area networks (LANs) for both purposes. By FY 1991, the LANs will connect approximately two hundred PCs using eight File Servers. To connect the remainder of the Institute, it will be necessary to continue to install file servers through FY 1993. In addition to file servers, these LANs will need gateways to link to internal and external scientific networks. The currently used gateways will be obsolete and unable to sustain the high bandwidths necessary to communicate with national supercomputer networks. Finally, several high capacity printers will be needed to replace special purpose printers that work only with the existing obsolete mainframe and word processors that are being replaced.

- Toxic Gas Monitoring System - toxic gas detectors and associated controls and instrumentation. A significant proportion of SERI's current and projected research requires the use of acutely toxic gases. These gases pose a potential hazard to individuals working directly with the gases as well as to personnel in the vicinity. The requested monitoring equipment will be used to upgrade the existing toxic gas monitoring system for higher reliability, and to provide additional detectors required for safety as programmatic requirements have evolved. The existing monitoring equipment is now ten-year-old technology. Extensive preventative maintenance work has kept this equipment in operating condition but with no room for expansion. The requested equipment will insure that SERI is able to maintain facilities for research using toxic gases, that provide personnel safety.

Solar Energy Research Institute

GENERAL PURPOSE EQUIPMENT (GPE) (continued)

- Scanning Tunneling and Atomic Force Microscope - precision and vibration-isolated scanning tunneling microscope (STM) system with associated electronics, computer control, and automation. This system will be a state-of-the-art analysis system that includes ultrahigh vacuum chambers. It will be configured by the commercial manufacturer to include SERI-developed special features for the differential imaging of atomic species and low-temperature measurements. The atomic force feature will allow the application of STM techniques to biological samples. Scanning tunneling microscopy has reached the point at which viable and dependable commercial units are available that will allow STM on a more routine basis - a capability required for the variety of rising STM needs for the Institute - ranging from electronic to biological. This equipment will enhance greatly the potential for attracting external funding to meet Institute goals. SERI programs are expected to be at the forefront of experimental research and development; the acquisition of no other piece of major equipment is so timely or as necessary to expand a wide range of experimental research, both program-related and externally-funded, for all technical areas of the Institute.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

SOLAR ENERGY

I. Preface: Solar Program Support

The purpose of this budget item is to provide cross-technology analytical and administrative support to the overall solar/renewable energy research effort.

II. A. Summary Table: Solar Program Support

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Solar Program Support	$ 970	$ 879	$ 900	+ 2
Total, Solar Program Support	$ 970	$ 879	$ 900	+ 2

II. B. Major Laboratory and Facility Funding

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Solar Energy Research Institute	$ 200	$ 150	$ 200	+ 33

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Solar Program Support			
Solar Program Support	Continue crosscutting Solar/Renewable Energy planning and analyses with thrust toward implementing multi-year technology development strategies.	Continue crosscutting Solar/Renewable Energy planning and analyses with thrust toward implementing multi-year technology development strategies.	Continue planning and analysis activities with thrust toward long-range energy market outlook/planning framework for renewable energy R&D in support of National Energy Strategy Requirements.
	$ 970	$ 879	$ 900
Solar Program Support	$ 970	$ 879	$ 900

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

SOLAR ENERGY

I. Preface: Resource Assessment

A reliable solar resource data base is essential for solar research and the deployment of solar technologies. It is needed by electric utility planners, solar researchers, and industrial engineers for developing, designing, siting and managing the operation of solar power systems (e.g., solar thermal, photovoltaic, and wind) and for evaluating their impact on a utility grid and its customers. For system engineering design practice and plant siting work, a verified, current, 30-year solar resource data base with approximately 5% statistical accuracy is being formulated for the first time in the United States. High quality U.S. solar resource data are being collected and archived in cooperation with NOAA, universities including 6 HBCU's, industrial and utility companies, and state and federal solar research centers. Solar irradiance models are under development to calculate solar radiation components at and between the few data collection sites, which do not themselves adequately cover the U.S. These models will be used to analyze the NOAA historical basic data (1961 to 1975) and improve recent (1976 to 1990) data, to produce the first 30-year solar resource data base for the U.S. land area by the end of FY 1991. The program is developing needed data bases and models specifying the spectral, temporal, and spatial variability of solar radiation characteristics, to guide the further development of solar technologies.

The program builds upon successful work conducted by HBCU's by beginning an effort to collect required insolation data from U.S. geographic regions not represented in the current solar data base. New data collection will begin at educational institutions, with emphasis on participation by minority colleges and universities and minority high schools; the institutions will expand the data network and incorporate science education initiatives based upon the technical foundation provided by this cooperative effort.

II. A. Summary Table: Resource Assessment

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Resource Assessment	$ 709	$ 753	$ 950	+ 26
Capital Equipment	45	0	50	+100
Total, Resource Assessment	$ 754	$ 753	$ 1,000	+ 33

II. B. Major Laboratory and Facility Funding

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Solar Energy Research Institute	$ 754	$ 753	$ 1,000	+ 33

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Resource Assessment			
Resource Assessment	Reprocess, QC, and archive insolation data collected since 1976 for about 100 sites; finalize methodology to improve 1961-75 SOLMET data base for 234 sites; continue cooperation with NOAA on data acquisition from their 31-station network and with other institutions; use recent IEA Task IX results to select, verify and implement a model to convert meteorological data to global-horizontal data; develop the SERI spectral model to handle air pollution conditions based upon 200 recently collected spectra; complete the QC and archival of 2800 spectra processed during FY 1988; collect 200 new spectra for a range of cloud-cover conditions.	Reprocess and improve accuracy of SOLMET (combined SOLar and METeorological data base) 1961-75 data base for 234 sites, from about 30% to 5-10% for generation of the first U.S. 30-year (1961-1990) solar radiation data base; reprocess and improve accuracy of 1976 to present data base (about 80 sites) to achieve about 5% accuracy and continue collection and quality control (QC) of current insolation data in cooperation with NOAA on the 31-station network, and with other sites, to be used to develop the 30-year national insolation data base; combine and evaluate the DISC model and the global-horizontal model to provide estimated direct-beam data from meteorological data; collect spectral data for a range of cloud-cover conditions and extend the spectral model for cloudy-sky conditions; process and combine 3,000 spectra into a U.S. spectral data base; cooperate with IEA in development of models.	Complete formulation of the first 30-year solar resource data base for the U.S.; continue cooperative arrangements and acquire high-quality current solar radiation data. Use the cloudy-sky extended model to calculate spectral data, and verify against measured spectra in preparation for development of a limited data base. Assess the detailed status of current solar resource models and accessibility and quality of solar resource data across the U.S. land area. Initiate planning of a project to acquire high-quality insolation data for data-deficient regions using selected high schools, colleges, and other sources having science education curricula, with emphasis on minority schools, to obtain broad-based participation in insolation resource measurements. Assess avenues for obtaining data bases for regions outside the U.S., needed for U.S. foreign competitiveness.
	$ 709	$ 753	$ 950

III. Resource Assessment (Cont'd):

Program Activity	FY 1988	FY 1990	FY 1991
Capital Equipment	Add solar radiation measurements instrumentation, supporting equipment, and computer auxiliary equipment.	No Activities.	Obtain components for development of low-cost insolation resource measurement instrumentation package.
	$ 45	$ 0	$ 50
Resource Assessment	$ 754	$ 753	$ 1,000

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

SOLAR ENERGY

I. Preface: Solar Program Direction

The FY 1991 budget request for Solar Energy Program Direction will support a full-time equivalent (FTE) staffing level of 60. The Federal Solar Energy staff activities consist of such functions as: project/task management, R&D coordination/technology transfer, and general administration duties.

II. A. Summary Table: Solar Program Direction

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Solar Program Direction	$ 4,380	$ 4,146	$ 4,350	+ 5
Total, Solar Program Direction	$ 4,380	$ 4,146	$ 4,350	+ 5

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Solar Program Direction			
Solar Program Direction	Supports a staff of 69 FTEs.	Supports a staff of 54 FTEs.	Supports a staff of 62 FTEs.
	$ 4,380	$ 4,146	$ 4,350
Solar Program Direction	$ 4,380	$ 4,146	$ 4,350

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(Obligations in thousands of dollars)

OBJECT CLASS SUMMARY

Solar Energy

Direct Funding:	FY 1989	FY 1990	FY 1991
11.1 Full-time permanent	$3,247	$3,107	$3,232
11.3 Other than full-time permanent	0	0	0
11.5 Other personnel compensation	325	311	323
11.9 Total personnel compensation	3,572	3,418	3,555
12.1 Civilian personnel benefits	487	342	356
21.0 Travel and transportation of persons	307	373	427
25.0 Other services	84,261	85,357	104,135
31.0 Equipment	2,592	2,743	2,610
32.0 Land & structures	250	173	4,790
Totals	$91,469	$92,406	$115,873

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

OVERVIEW

GEOTHERMAL ENERGY

The upcoming decade is a critical period for energy supply in the United States and the relationship of environmental, economic, and energy policy will be shaped for the 21st century. FY 1991 - 1995 funding decisions will greatly influence the timing and the degree to which the vast potential of geothermal energy can be deployed by industry in the short, mid, and long term. The proposed FY 1991 Geothermal Energy program is responsive to these challenges. It represents a major focusing of federal resources on the highest payoff opportunities, and establishes the applied research and development activities necessary to attract capital and industrial commitments to exploit this technology.

The modular character of geothermal power systems makes them excellent candidates for incremental generating capacity that can be tailored to power needs and constructed with relatively short lead times. Also, most geothermal resources can furnish inexpensive direct heat to co-located consumers. In addition to being a reliable baseload power source, geothermal energy is relatively benign environmentally. Both spent fluids and noncondensible gases can be injected back into the subterranean environments from which they are produced. Properly designed geothermal plants are characterized by little or no gaseous emissions to the atmosphere and no contamination of ground water. Because they are built adjacent to their fuel supplies, geothermal installations require no extensive transportation system to move large quantities of fuels.

Hydrothermal geothermal technology, producing steam-generated electricity from high-quality underground reservoirs, is used in 45 plants operating in six states. Hydrothermal resources generate about 6% of all the electricity in California. This resource has a baseload reliability unequalled by any other current energy source, with a 95-99% availability experienced from current plants. However, the current technology is cost effective only in the few cases where the location and magnitude of the reservoir is known from experimentation.

The proposed Geothermal Energy budget therefore represents a shift in focus from previous years: FY 1991 represents the first year of a significant effort to develop the reservoir, drilling, and conversion technologies necessary to exploit the multigigawatt potential of hydrothermal geothermal through the mid-term. Industry does not currently possess sufficient data and techniques to reduce risks associated with this complex resource base to levels that permit economical deployment of the technology. The Departmental initiatives in hydrothermal research will be funded by deferring research associated with very long term options (e.g., magma) and by reducing funding for long-term options and those with more uncertain benefits (e.g., geopressured).

The goal for hydrothermal technology is to reduce the life-cycle cost of producing electricity with moderate-temperature hydrothermal fluids, facilitating private development of as much as 21,000 megawatts (2.8 quads) of cost-effective energy potential available to the U.S in the long-term. Research will focus on developing effective technologies for: finding and evaluating hydrothermal prospects, reducing the extraordinarily high cost of well drilling, and efficiently converting geothermal heat to electric power at competitive costs. Coupled with advanced materials that withstand high temperatures and chemically aggressive environments, and techniques for managing the production of hot brine and the injection of spent brine, this research will reduce developer risk and cost, markedly expanding the economically recoverable hydrothermal resource base.

The proposed investment in geothermal energy research and development is appropriate in light of the large contribution geothermal energy can make toward expanding the Nation's energy supply. Past research already has begun to pay dividends. For example, royalties from geothermal power generated on Federal land now exceed the proposed funding level for DOE geothermal research. These revenues can be expected to increase substantially as the improving technology base provides industry with better opportunities to exploit more of the Nation's geothermal resources. Additionally, as in previous years the budget supports the performance of beneficial work for other activities performed on a reimbursable basis including costs associated with the use of facilities and staff resources.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

LEAD TABLE

GEOTHERMAL ENERGY

Activity	FY 1989[1/]	FY 1990[2/]	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Geothermal Energy						
Operating Expenses	$18,526	$17,633	$17,633	$17,595	$ -38	+ 0%
Capital Equipment	$ 795	$ 444	$ 444	$ 405	$ -39	- 9%
Subtotal, Geothermal Technology	$19,321	$18,077	$18,077	$18,000	$ -77	0%
TOTAL	$19,321	$18,077	$18,077	$18,000	$ -77	0%
Summary						
Operating Expenses	$18,526	$17,633	$17,633	$17,595	$ -38	+ 0%
Capital Equipment	795	444	444	405	-39	- 9%
Total Program	$19,321	$18,077	$18,077	$18,000	$ -77	0%
Staffing (FTE's)	16	10	10	9		

Authorization:
- P.L. 93-410, "Geothermal Energy Research, Development and Demonstration Act of 1974"

1/ $235K Reduction

2/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments P.L. 101-101 general reductions, and P.L. 101-164 reduction to fund anti-drug activities.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Geothermal Energy

FY 1990 Appropriation	$ 18,334
Adjustments	-257
FY 1991 Base	$ 18,077
Geothermal Technology Development	
- Hard Rock Penetration Research	+1,167
- Reservoir Technology	+1,902
- Conversion Technology	+1,251
- Hot Dry Rock Research	+174
- Geopressured Research	-2,955
- Magma Energy	-1,663
- Program Direction	+86
- Capital Equipment	-39
Total Geothermal Energy	-77
FY 1991 Congressional Budget Request	$ 18,000

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

GEOTHERMAL ENERGY

I. Preface: Geothermal Technology

The Geothermal Energy Program seeks to lessen the Nation's dependence on foreign energy supplies by fostering the use of indigenous, uninterruptible sources of geothermal energy. Beginning in FY 1991, the primary program goal is to develop the technology base necessary for industry to reduce the cost of power from hydrothermal resources to 3 - 7 cents/kWh by 1997, and increase the power production potential to 21,000 MWe. This goal will be accomplished by developing technology needed to exploit a wide variety of geothermal resources. No new initiatives will be taken in FY 1991 to geopressured and hot dry rock, and magma research will be deferred in order to place increased effort on hydrothermal objectives, accelerating the research objectives which the geothermal industry indicates it needs the most; within the Program R&D activities whose costs are shared (approximately 30 percent) with the private sector, and whose results are validated by the industrial users will be emphasized. FY 1991 cost shared activities will include the joint development of instruments, equipment, materials, techniques, models and systems; they provide a ready means of rapid, efficient technology transfer. By employing a strategy that couples applied R&D with timely technology transfer, the Program will enhance the competitiveness and flexibility of the Nation's energy markets.

II. A. Summary Table: Geothermal Technology

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Geopressured Research	$ 5,930	$ 5,855	$ 2,900	- 50
Geothermal Technology Development				
Hard Rock Penetration Research	2,250	2,233	3,400	+ 52
Reservoir Technology	2,450	2,080	4,000	+ 91
Conversion Technology	1,935	1,544	2,795	+ 81
Hot Dry Rock Research	3,500	3,426	3,600	+ 5
Magma Energy	1,635	1,863	0	-100
Subtotal, Geothermal Technology Development	$ 11,770	$ 10,964	$ 13,795	+ 26
Capital Equipment	$ 795	$ 444	$ 405	- 9
Program Direction	626	814	900	+ 11
Total, Geothermal Technology	$ 19,321	$ 18,077	$ 18,000	0

II. B. Major Laboratory and Facility Funding

	FY 1980 Actual	FY 1980 Estimate	FY 1981 Request	% Change
Brookhaven National Laboratory	$ 715	$ 0	$ 0	0
Idaho National Engineering Laboratory - EG&G	$ 1,720	$ 1,403	$ 1,500	0
Lawrence Berkeley National Laboratory	$ 600	$ 0	$ 0	0
Los Alamos National Scientific Laboratory	$ 3,600	$ 3,370	$ 3,600	+ 7
Sandia National Laboratories	$ 4,000	$ 3,452	$ 3,060	- 11

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1980	FY 1980	FY 1981
Geothermal Technology			
Geopressured Research	Conduct pressure buildup tests at the Gladys McCall site. Perform long-term flow testing of the reservoir at Pleasant Bayou site; complete installation of the energy conversion system and cost share its operation with industry. Begin rework of Hulin well.	Complete flow and pressure testing at the Gladys McCall site; conduct long-term flow testing of the reservoir at Pleasant Bayou site; operate energy conversion system. Conduct preliminary flow testing of Hulin well.	Complete flow testing at the Pleasant Bayou site; begin final scientific tests; dismantle energy conversion system. Conduct short-term flow test at the Hulin site, and transfer information to industry.
	Carry out supporting university-based research on reservoir rock mechanics, reservoir modeling, logging, liquid hydrocarbons, and environmental effects.	Carry out university-based research on reservoir rock mechanics, reservoir modeling, logging, liquid hydrocarbons, and environmental effects.	Carry out university-based research on reservoir rock mechanics, reservoir modeling, logging, liquid hydrocarbons, and environmental effects.
	$ 5,930	$ 5,855	$ 2,900
Geothermal Technology Development			

III. Geothermal Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Hard Rock Penetration Research	Prepare for field tests of downhole air turbines, drill pipe protectors, foam system for lost circulation control, and radar fracture mapping tool. Build lab model of new data telemetry system. Field test new insulated drill pipe. Design downhole modular instrument memory system. Design second generation radar fracture mapping tool.	Field test insulated drill pipe under operating conditions; conduct preliminary test of a second generation radar fracture mapping tool.	Field test second generation radar fracture mapping tool and obtain joint DOE/industry funding (50/50) for advanced testing. Field test (400 degrees C) downhole microprocessor/memory tools for temperature, pressure and flow measurements.
		Acquire data on well behavior to verify circulation models and provide analytical support for field evaluation of lost circulation materials. Field test pumpable setting fluids, cements and foam lost circulation materials.	Measure characteristics of lost circulation zones; correlate experimental and field data. Field test emplacement techniques and materials (encapsulated cements, foams, and bridging materials) for lost circulation control. Begin design of artificial intelligence system for lost circulation, which will enable industry to more quickly solve lost-circulation problems as they occur. Design and fabricate a porous packer and new material injector tools for lost circulation.
	Develop technology to enhance capability of drilling high temperature geothermal formations at lower cost. Develop concept for a core drilling system for deep thermal regimes.		Begin development of a high energy gas fracturing tool to stimulate marginal geothermal wells. Improved stimulation technology can extend reservoir life as at the Geysers.
	To ensure industry utilization of successful new technology, cost-share final development stages to provide field-ready equipment under the Geothermal Drilling Organization (GDO).	To ensure industry use of new technology, cost-share (50/50) final stages of development with the Geothermal Drilling Organization (GDO) to provide field-ready equipment for service companies and operators.	To ensure industry use of new technology, cost-share (50/50) final stages of development with the Geothermal Drilling Organization (GDO) to provide field-ready equipment for service companies and operators.
	$ 2,250	$ 2,233	$ 3,400

III. Geothermal Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Reservoir Technology	Investigate surface and borehole geophysical techniques to determine location and extent of fluid filled fractures in geothermal reservoirs. Field test these techniques in cost-shared research with industry.	Develop predictive models for the flow of injected fluid through geothermal reservoirs. Model the decrease in temperature and changes in pressure and water chemistry due to brine injection. Use field-wide well-interference testing to confirm the field modeling.	Cooperate with industry on the application of a major injection program to maintain production at The Geysers geothermal field. Develop a theoretical model of The Geysers to determine the best locations for injection wells so that injection does not cool down the producing fractures. Identify the required reservoir data and develop interpretive methods to determine reservoir structure and fluid flow mechanisms. Cost share with developers the field verification of different injection methods, and determine the reservoir model that will permit the placement of injection wells to recover the most residual heat from the rocks.
	Incorporate fracture flow characteristics in computer modeling of geothermal reservoirs.	In cooperation with industry, conduct a DOE-industry field case study to compare various technologies that have become available for geothermal exploration and reservoir management. The comprehensive study will apply the new technology of geothermal reservoir analysis (e.g., magnetotelluric surveying, vertical seismic profiling, and spontaneous potential) to a "type" reservoir; and interpretation of the results will compare the effectiveness of all techniques. Special emphasis will be placed on the synergistic effects of two techniques producing better quality data when combined than the sum of data from each used separately.	Develop chemical tracers that can show the fluid flow path in both liquid and vapor phase portions of a geothermal reservoir. Conduct field testing and verification of the tracers, and develop interpretation methods to locate optimum sites for fluid injection. Field test electromagnetic instrumentation for tracking fluid flow in geothermal reservoirs. Compare surface geophysics to new down-hole techniques. Determine the mechanism of formation for hydrogen chloride in The Geysers reservoir, and investigate transport in the steam phase. Conduct laboratory experimentation and field verification to develop a usable method to control acid formation. Conduct field test with industry using cost-sharing and joint research. Extend the techniques developed at The Geysers so that they can be used in other geothermal fields.

III. Geothermal Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Reservoir Technology (Cont'd)	Develop well testing methods and interpretative techniques to determine the distance and direction to flow barriers and reservoir boundaries. Modify existing reservoir models to incorporate these well test methods.		In cooperation with industry, develop reliable micro-computer models that will accurately predict energy recovery and pressure decline for geothermal reservoirs, thereby reducing a major risk of development. Investigate geochemical reactions in the reservoir to develop control or abatement methods to limit corrosion and scaling in geothermal wells. Investigate biogeochemical exploration for use in locating geothermal reservoirs. Apply promising advances in remote sensing to exploration for new geothermal resources. Use new, sensitive satellite and airborne imaging techniques to detect subtle differences in reflection and absorption spectra of hydrothermal mineral deposits.
	Develop a realistic thermodynamic description of the physical and chemical properties of injected fluid as it moves into the geothermal reservoir. Incorporate fluid mixing, heating, and chemical reaction into this description. Field test new chemical compounds for use as geothermal tracers in two-phase and vapor-dominated geothermal reservoirs. Provide models for interpretation of tracer breakthrough in geothermal systems, and relate chemical front movement to that of the thermal front in geothermal injection systems.		

III. Geothermal Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Reservoir Technology (Cont'd)	Support funding DOE-industry joint projects via Geothermal Technology Organization (GTO).	Cost share (50/50) with industry new research initiatives developed through the Geothermal Technology Organization (GTO).	Develop the techniques needed to control well production without damaging either the reservoir or the wells. This work will be conducted via the Geothermal Technology Organization (GTO).
	$ 2,450	$ 2,098	$ 4,000
Conversion Technology	Complete move of Heat Cycle facility to new site. Test supercritical cycle with condenser at final orientation and working fluid composition. Test condensation behavior of metastable supersaturated expansions in two-dimensional nozzle and reaction turbine. Develop specifications for sieve tray direct-contact or other advanced heat exchangers with reduced working fluid losses and increased throughput. Evaluate advanced heat rejection schemes	Test performance of mixed working fluids in supercritical cycles. Investigate condensation behavior of metastable hydrocarbon turbine exhausts.	Complete field investigation of metastable hydrocarbon turbine exhausts; complete field testing of mixed working fluids in supercritical cycles. Begin investigation of advanced heat rejection technology in order to reduce the costs of power produced from low- and moderate-temperature geothermal resources. Evaluate concepts for advanced modular binary-cycle energy conversion systems. Select concept and initiate design studies.
	Complete lab testing of elastomeric stator for mud motor. Field test casing cements in high-temperature, high-CO2 geothermal wells. Develop cements and ceramics for well completions and castable casings for application in magma energy extraction. Continue field tests of cladding materials for well casings to get longer-term data.	Test CO2-resistant cements downhole and develop 600 degrees Celsius ceramic cements. Participate in field tests of lost-circulation control methods and mud motors. Analyze performance of polymer concrete-lined heat exchanger tubing in binary fluids.	Develop new, multipurpose high-temperature drilling muds that can be converted in-situ into well cements/lost circulation materials. Seek industrial partner to move from development to commercialization. Complete downhole testing of CO2-resistant lightweight cements. Test durability of ceramic cements in high-temperature environments. Continue development of high-temperature systems for bonding elastomers to metallic substrates.

III. Geothermal Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Conversion Technology (Cont'd)	Conduct both laboratory and theoretical research to model the thermodynamic behavior of geothermal brines in order to predict potential scale formation in reservoirs and powerplant facilities. Specific research will be directed toward extending model parameters to include alumino-silicates and metal sulfides. Complete cost-shared process chemistry test program in cooperation with electric utilities. Analyze the process chemistry test results. Dismantle the field equipment.	Carry out laboratory and theoretical research to develop a unique thermodynamic brine model capable of predicting potential scale formation in reservoirs and powerplant equipment. Extend model parameters for alumino-silicates, sulfates, and hydrogen sulfide.	Field test accuracy of the brine chemistry model. Incorporate higher pressure limits in the model to more accurately predict breakout conditions for important gases, such as methane and hydrogen sulfide. Conduct supporting laboratory experiments to provide the needed data base. Incorporate results into the model.
	Conduct biochemical experiments to explore environmentally acceptable ways of disposing of geothermal wastes that can contain such toxic elements as chromium, arsenic and lead. Perform experiments to determine conditions under which key biochemical processes work best.	Scale up biochemical experiments to evaluate the most promising techniques to dispose of geothermal wastes containing hazardous and toxic elements that exceed regulatory limits.	Carry out biochemical experiments using different sludge compositions, loadings and mixing times in order to generate data needed for larger bioreactor designs (with volumes up to 350 gallons). Also, in cooperation with industry, upgrade existing bioreactor designs as more bioprocessing knowledge is obtained.
	$ 1,835	$ 1,544	$ 2,795
Hot Dry Rock Research	Conduct the long lead-time planning and support activities required for the Long-term Flow Test (LTFT). Purchase and install the surface equipment required to conduct the LTFT. Continue development of instruments, analytical techniques and reservoir models necessary to transfer the HDR technology to industry.	Complete procurement and installation of components required for the LTFT. Conduct preliminary system flow tests in preparation for the LTFT.	With industrial support, conduct reservoir evaluation tests at Fenton Hill site to establish baseline hot dry rock reservoir characteristics under full operating conditions. Collect data on the operation and maintenance of the HDR reservoir for analysis and transfer to industry. Perform a quality assurance evaluation of the operating data to verify their accuracy. Industry participation during the tests will facilitate the transfer of HDR technology as the project enters its final phase.

III. Geothermal Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Hot Dry Rock Research (Cont'd)		Conduct the environmental monitoring of the Fenton Hill site and surrounding area. Provide sufficient water to conduct the LTFT. Maintain the site in a safe manner consistent with conducting a major experiment. Conduct necessary wellbore logging.	Monitor seismicity during site operations to gain knowledge about reservoir behavior. Perform environmental monitoring activities at the Fenton Hill site.
		Analyze initial reservoir thermal/fluid dynamic performance. Using microseismic analysis, evaluate the initial behavior of the reservoir and compare with predictive models. With geochemical techniques in conjunction with seismic techniques, assess the size and performance of the reservoir.	Use chemically reactive tracers to monitor the characteristics of the HDR reservoir. Revise reservoir model based on results of flow tests.
	$ 3,500	$ 3,426	$ 3,600
Magma Energy	Drill the exploratory well to shallow depth in Long Valley caldera. Deploy seismic and electromagnetic instruments in the well to determine the existence of magma beneath the caldera.	Accomplish appropriate research on the exploratory well and transfer information to private industry and to the scientific community.	No activities planned.
	Investigate core and cuttings to estimate characteristics and compositions of vapor and melt phases of the magma system. Conduct scientific experiments in cooperation with other sponsoring organizations.	Conduct ongoing scientific experiments in cooperation with other sponsoring organizations.	
	Continue limited development of high-temperature instruments and equipment for use in a magma environment.		
	$ 1,635	$ 1,663	$ 0
Subtotal, Geothermal Technology Development	$ 11,770	$ 10,964	$ 13,795

III. Geothermal Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Capital Equipment	Laboratory apparatus and production equipment in support of geothermal R&D activities.	Laboratory apparatus and production equipment in support of geothermal R&D activities.	Laboratory apparatus and pruduction equipment in support of geothermal R&D activities.
	$ 795	$ 444	$ 405
Program Direction	Supports a staff of 16 FTEs to manage a broad range of Geothermal R&D activities, including one FTE to manage Hydropower activities.	Supports a staff of 10 FTEs to manage a broad range of Geothermal R&D activities.	Supports a staff of 9 FTEs to manage a broad range of Geothermal R&D activities.
	$ 826	$ 814	$ 900
Geothermal Technology	$ 19,321	$ 18,077	$ 18,000

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(Obligations in thousands of dollars)

OBJECT CLASS SUMMARY

Geothermal

Direct Funding:	FY 1989	FY 1990	FY 1991
11.1 Full-time permanent	$565	$536	$513
11.3 Other than full-time permanent	0	0	0
11.5 Other personnel compensation	57	54	51
11.9 Total personnel compensation	622	590	564
12.1 Civilian personnel benefits	85	59	56
21.0 Travel and transportation of persons	116	163	278
25.0 Other services	17,703	16,821	16,202
31.0 Equipment	795	444	900
32.0 Land & structures	0	0	0
Totals	$19,321	$18,077	$18,000

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

OVERVIEW

HYDROPOWER

Hydropower contributes to the Nation's energy security because it is indigenous, abundant and not subject to interruption or control from outside the United States. It is a source of energy stability because it is not rapidly depletable. Hydropower can provide energy as both base-load and peaking electricity with high availability. Finally, hydropower contributes to clean air goals, including the reduction of greenhouse and acid gas emissions, by displacing electricity generated by fossil fuels.

According to published Federal Energy Regulatory Commission data as of January 1, 1988, undeveloped hydropower capacity in the United States is 95,200 MW. This undeveloped capacity consists of conventional (76,100 MW) and pumped storage (19,100 MW). These data indicate that the United States has only developed 49.5 percent of the total hydropower capacity. Hydropower technology is generally well developed, but extensive interaction with FERC and industry sources has identified a time-consuming, costly, disorganized licensing/permitting process, largely due to the duplicative environmental review process, with overlapping layers of jurisdiction, as major impediments to hydropower development. The FY 1991 hydropower funds are being requested to conduct studies and coordinate activities to address the institutional and regulatory impediments to developing and maintaining hydropower potential. These activities will support development of criteria and evaluation methodologies to facilitate a consensus by the various organizations involved in license review.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

LEAD TABLE

HYDROPOWER

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Hydropower						
Operating Expenses	$ 0	$ 0	$ 0	$ 1,000	$ +1,000	+100%
Capital Equipment	0	0	0	0	0	0%
Subtotal	$ 0	$ 0	$ 0	$ 1,000	$ +1,000	+100%
TOTAL	$ 0	$ 0	$ 0	$ 1,000	$ +1,000	+100%
Summary						
Operating Expenses	$ 0	$ 0	$ 0	$ 1,000	$ +1,000	0%
Capital Equipment	0	0	0	0	0	0%
Total Program	$ 0	$ 0	$ 0	$ 1,000	$ +1,000	+100%
Staffing (FTE's)	0	0	0	1		

Authorization:
- P.L. 93-577, "Non Nuclear Energy Research and Development Act of 1974, Section 4"
- P.L. 95-617, "Public Utilities Regulator Policies Act of 1978"
- P.L. 96-294, "Energy Security Act of 1980"

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Hydropower

FY 1990 Appropriation	$ 0
Adjustments	0
FY 1991 Base	$ 1,000
Hydropower	
- Studies and Coordinating Activities	+ 920
- Program Direction	+80
- Capital Equipment	0
Total Hydropower	+1,000
FY 1991 Congressional Budget Request	$ 1,000

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

HYDROPOWER

I. Preface: Hydropower

The Nation has considerable unutilized hydropower capacity which can enhance electric supplies without contributing to acid rain or greenhouse gases. Hydropower technology is well developed, but under utilization of resources appears to be due to regulatory complexities. This goal of improved energy security will be accomplished by providing a basis to resolve the regulatory impediments to allow industry to exploit the remaining available hydropower resources. To the extent practicable, the program emphasizes activities whose costs are shared with the private sector. These activities support studies and coordinating activities to address the institutional and regulatory impediments to developing and maintaining hydropower potential.

II. A. Summary Table: Hydropower

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Studies and Coordinating Activities	$ 0	$ 0	$ 920	+100
Program Direction	0	0	80	+100
Capital Equipment	0	0	0	0
Total, Hydropower	$ 0	$ 0	$ 1,000	+100

II. B. Major Laboratory and Facility Funding

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Idaho National Engineering Laboratory - EG&G	$ 0	$ 0	$ 680	+100
Oak Ridge National Laboratory	$ 0	$ 0	$ 320	+100

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Hydropower			
Studies and Coordinating Activities	No Activities.	No Activities.	Critically review and evaluate regulatory/licensing policies and practices, including evaluation criteria and methodologies, and quantifying benefits and costs of environmental mitigation practices. Initiate coordinating activities among organizations involved in the hydropower regulatory review process.
	$ 0	$ 0	$ 920
Program Direction	No Activities.	No Activities.	Support 1 FTE
	$ 0	$ 0	$ 80
Capital Equipment	$ 0	$ 0	$ 0
Hydropower	$ 0	$ 0	$ 1,000

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(Obligations in thousands of dollars)

OBJECT CLASS SUMMARY

Hydropower

Direct Funding:	FY 1989	FY 1990	FY 1991
11.1 Full-time permanent	$0	$0	$66
11.3 Other than full-time permanent	0	0	0
11.5 Other personnel compensation	0	0	7
11.9 Total personnel compensation	0	0	73
12.1 Civilian personnel benefits	0	0	7
21.0 Travel and transportation of persons	0	0	0
25.0 Other services	0	0	920
31.0 Equipment	0	0	0
32.0 Land & structures	0	0	0
Totals	$0	$0	$1,000

28-657 O—90—16

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

OVERVIEW

ELECTRIC ENERGY SYSTEMS AND ENERGY STORAGE SYSTEMS

The Office of Energy Storage and Distribution (OESD) supports research aimed at providing the private sector with the basis for new technological options in the nation's electric energy systems and in energy storage. These will have wide ranging applications in industrial, commercial, residential and transportation sectors. Technology and systems information developed through this program will enable the integration into the nation's energy delivery infrastructure, of renewable and conservation options that will play an increasingly critical role in the future U.S. energy profile.

The U.S. electric industry is currently reluctant to initiate large-scale generation projects due to their significant capital costs and the uncertainty and timing of future electrical demand increases. Large generating plants take some years to put on line, but a healthy economy may lead to substantial demand growth over the next decade. Furthermore, over the next two decades a substantial fraction of existing power plants will reach retirement. Rising electrical demand is anticipated to converge with constrained supply sometime in the late 1990's, and it is estimated that the U.S. will need to construct or refurbish up to 100,000 to 250,000 megawatts of electrical capacity by the turn of the century. By developing the means, both to deliver electrical energy at a higher level of efficiency and to store this energy at a utility bulk power scale, the Department's R&D program can cause a significant reduction in the future economic investment required in the national utility system.

Our research goals have been internally reprioritized and reflect substantial commitment to areas of significant return. Foremost in the Electric Energy Systems program is applied High Temperature Superconductivity (HTS) research where success will translate to fundamental improvements in electric generation, transmission, distribution, and storage. Critical to achieving these national returns are investments responsive to private sector priorities and willingness to coinvest in important enabling technology. The FY 1991 program focuses the research program and expands the Pilot Center support of projects proposed and cost-shared by industry. Also emphasized are efforts to evaluate the potential health effects due to electrical and magnetic fields associated with high voltage transmission and distribution systems, and options to maintain grid-wide reliability and improve transfer of power between regional areas.

Research within the Energy Storage program includes a vital effort to move from exploratory research to applied research and development in solid polymer (Proton Exchange Membrane) fuel cells for both mobile and stationary

applications. Achieving required levels of power density and subsystem lifetime would provide industry with a significant option for commercially available methanol-based applications prior to the end of the decade.

The Electric Energy Systems research program is strongly focused on the development of high temperature superconducting technologies for electric systems applications. The high temperature superconductors offer the potential to carry electric current with little or no loss at critical temperatures of 95-120 K. The key research issue is to develop suitable superconducting wires and cables for use in transmission lines, magnetic storage devices, and electric generators. The goals of the DOE program are to improve the current densities of bulk high temperature superconducting materials from the current levels of 1000 amps per cm^2 to 100,000 amps per cm^2 (in magnetic fields up to 2 Tesla). The program emphasizes practical conductor development, improving critical current densities in wires and tapes, and materials processing and fabrication techniques. This program includes substantial cost-sharing from private industry. In addition to the cost-sharing DOE-directed research, recently established Pilot Centers offer an innovative approach to involve the private sector in all stages of research projects, and accelerate the transfer of results to the marketplace. These industry-driven projects at the HTS Pilot Centers have grown far greater in number and quality than even the most optimistic early predictions. The Pilot Centers provide a vehicle for collaboration between national laboratories and private industry - the best way of transferring new technology to the private sector for commercialization. This collaboration allows industry to identify, cost-share, and own intellectual rights for the marketing of the new materials and products. In increasing numbers, industry and laboratories are transferring personnel back and forth as an integral part of the research, providing a direct transfer of knowledge at the working level.

The potential impacts of the new superconducting devices for power systems include improved operating characteristics, better efficiency and stability, and ultimately lower cost. Further, a new multi-billion dollar U.S. industry in superconducting transformers, motors, generators, magnetic energy storage, and other power devices could provide the basis for regaining a huge domestic market, and the possibility of springboarding to the even larger international market.

Other Electric Energy Systems research focuses on: (1) understanding the biological effects and risks to life forms exposed to high voltage electric and magnetic fields; (2) providing a broad technical understanding of the options required to maintain adequate reliability of electric networks in face of new uncertainties in operating with renewable, dispersed, and distributed energy sources, cogeneration, independent power producers, and storage; and (3) developing a range of new materials, components, and control strategies that will allow the future devices and systems to operate optimally.

The Energy Storage Systems program supports a broad spectrum of research activities. Beginning in FY91 major emphasis will be placed on generic research for the Proton Exchange Membrane (PEM) fuel cell for all mobile and stationery applications. A hybrid of this fuel cell system and a small battery could be an eventual breakthrough in making electric vehicles a reality. Direct pollutant emissions from these vehicles will be negligible, resulting in an improvement in urban air quality.

The near-term objective for the fuel cell R&D effort is to reduce the projected capital and operating costs. The focus of the work will be on reducing the expensive platinum catalyst needed (or replacing it altogether with a less expensive, but effective non-precious-metal substitute), and also on improving membrane efficiency and extending the PEM fuel cell life. In the mid-term, the goal is to improve the efficiency of the entire system and begin life testing. For the long-term, the goal will be to develop catalysts which will permit the elimination of the reformer now required to process the fuel, while maintaining a high operating efficiency. With elimination of the reformer, the fuel cell technology can be expected to make a rapid penetration into the marketplace.

A shortfall in electric generating capacity is expected in the next decade by most forecasters; the use of electrical storage in the form of batteries could vastly improve the nation's ability to cope with this shortfall. By shifting peak demand to batteries, both system and power plant effectiveness can be increased, air pollutants reduced, and profitability improved. Research and development will continue on bulk-electric storage technologies. The efforts will be directed to: (1) understanding the complex electrochemical phenomena governing the performance of batteries and fuel cells; (2) improving the performance of near-term batteries for early entry into the electric network; (3) providing the technology transfer opportunities for private industry to pick up the development of selected products nearing the end of the R&D cycle.

In summary, the potential for superconductivity, applied to electric power system and devices is immense. The application of the advanced fuel cell to transportation vehicles is very large. The total impact of these technologies on the ecosystem is equally impressive. For these reasons, the priority of R&D for these is uppermost. In order to accommodate this emphasis, other technology R&D efforts have been decreased. These latter technologies are not of lesser technical importance, but because of urgent national needs, the superconductivity and fuel cell technologies are the major thrusts in the OESD program. Additionally, as in previous years the budget supports the performance of beneficial work for other activities performed on a reimbursable basis including costs associated with the use of facilities and staff resources.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

LEAD TABLE

ELECTRIC ENERGY SYSTEMS AND ENERGY STORAGE SYSTEMS

Activity	FY 1989	FY 1990 2/	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Electric Energy Systems						
Operating Expenses	$24,316 4/	$17,828 3/	$17,828	$26,447	$ +8,619	+48%
Capital Equipment	0	0	0	900	+900	+100%
Subtotal	$24,316	$17,828	$17,828	$27,347	$ +9,519	+53%
Energy Storage Systems						
Operating Expenses	$11,841 1/	$12,020	$12,020	$12,606	$ +586	+5%
Capital Equipment	27	27	27	300	+273	+1,011%
Subtotal	$11,868	$12,047	$12,047	$12,906	$ +859	+7%
TOTAL	$36,184	$29,875	$29,875	$40,253	$+10,378	+35%
Summary						
Operating Expenses	$36,157	$29,848	$29,848	$39,053	$ +9,205	+31%
Capital Equipment	27	27	27	1,200	+1,173	+4,344%
Total Program	$36,184	$29,875	$29,875	$40,253	$+10,378	+35%
Staffing (FTE's)	14	10	10	10		

LEAD TABLE

ELECTRIC ENERGY SYSTEMS AND ENERGY STORAGE SYSTEMS (CONT.)

Authorizations:
- P.L. 93-409, "Solar Heating and Cooling Demonstration Act of 1974"
- P.L. 93-577, "Federal Non-nuclear Energy Research and Development Act of 1974"
- P.L. 94-413, "Electric and Hybrid Vehicle Research, Development and Demonstration Act of 1976"
- P.L. 95-91, "Department of Energy Organization Act"
- P.L. 95-590, "Solar Photovoltaic Energy Research, Development, and Demonstration Act of 1978"
- P.L. 95-619, "National Energy Conservation Policy Act of 1978"

1/ 23SE SBIR Reduction

2/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments P.L. 101-101 general reductions, and P.L. 101-164 reduction to fund anti-drug activities.

3/ $145K of SMES funds transferred from Energy Storage Systems to Electric Energy Systems.

4/ $750K of SMES funds transferred from Energy Storage Systems to Electric Energy Systems.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Electric Energy Systems and Energy Storage Systems

FY 1990 Appropriation	$30,603
Adjustments	-728
FY 1991 Base	$29,875
Electric Energy Systems	
- Electric Energy Systems Research	
-- Electric Field Effects	-428
-- Reliability Research	-862
-- Systems and Materials Research	+9,784 1/
- Program Direction	+125
- Capital Equipment	+900
Subtotal Electric Energy Systems	+9,519
Energy Storage Systems	
- Energy Storage Systems	
-- Battery Storage	+1,032
-- Thermal and Chemical Storage	-464 1/
- Program Direction	+18
- Capital Equipment	+273
Subtotal Energy Storage Systems	+859
FY 1991 Congressional Budget Request	$40,253

1/ FY 1990 funds transferred form Energy Storage Systems to Electric Energy Systems.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

ELECTRIC ENERGY SYSTEMS AND ENERGY STORAGE SYSTEMS

I. Preface: Electric Energy Systems

The Electric Energy Systems program conducts research and development to meet the requirements for a cost effective, reliable and environmentally safe electric utility network into the twenty-first century. The program is strongly focused on the development of superconducting enabling technologies. All activities are conducted at National Laboratories, universities, and corporate laboratories. These activities include private sector participation in all phases of the research. New technology-sharing collaborative agreements with private industry are being developed as part of the recently established high temperature superconductivity pilot centers. The concept of industry-driven research through simplified contracting, and negotiated intellectual property rights is being expanded. Along with DOE's funding for superconductivity, an additional 55% ($12,000,000) in industry cost-sharing is expected for 1991. To achieve the electric system requirements into the next century, additional research activities will include: determination of the biological health risks due to exposure to high voltage electric and magnetic fields; development of methods and options to ensure appropriate system reliability and the efficient use of renewable resources during expansion of the Nation's future electric networks; development of techniques to provide electric power over a wide range of systems conditions needed for national security; and development of power system components and new design concepts for advanced technology using new and improved materials, particularly high temperature superconductors.

II. A. Summary Table: Electric Energy Systems

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Electric Field Effects	$ 3,000	$ 2,928	$ 2,500	- 15
Reliability Research	2,494	2,434	1,572	- 35
Systems and Materials Research	18,472	11,977	21,761	+ 82
Program Direction	350	489	614	+ 26
Capital Equipment	0	0	900	+100
Total, Electric Energy Systems	$ 24,316	$ 17,828	$ 27,347	+ 53

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II. B. Major Laboratory and Facility Funding

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Argonne National Laboratory	$ 3,259	$ 3,330	$ 6,140	+ 84
Brookhaven National Laboratory	$ 1,150	$ 550	$ 800	+ 45
Lawrence Berkeley National Laboratory	$ 930	$ 530	$ 920	+ 74
Los Alamos National Scientific Laboratory	$ 2,100	$ 2,490	$ 5,600	+125
Oak Ridge National Laboratory	$ 4,806	$ 4,313	$ 6,900	+ 60
Pacific Northwest Laboratory	$ 1,100	$ 664	$ 750	+ 13
Sandia National Laboratories	$ 1,000	$ 800	$ 800	0
Solar Energy Research Institute	$ 1,930	$ 400	$ 600	+ 50

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Electric Energy Systems			
Electric Field Effects	Focus research on the effects of magnetic fields on biological systems, and expand studies on abnormal cell growth due to electromagnetic fields. Continue fundamental work in identifying field interactions with cell membranes.	Continue research on effects of magnetic fields including effects on cell growth and cell membranes. Study the effects of electromagnetic fields on the nervous system. Initiate study on endocrine and behavioral effects on exposed primates.	Continue research on effects of magnetic and electric fields on living organisms, with emphasis on abnormal cell/tissue growth, and overall biological health for whole animals and humans.
	$ 3,000	$ 2,928	$ 2,500
Reliability Research	Continue assessment of high energy pulse impact on power and transmission systems; continue experiments on EMP effect on complex facilities.	Continue assessment of impact of EMP on power and transmission systems, including components.	Expand analyses of fast transients on utility networks to include effects of geomagnetic storms, lightening and switching surges. Complete documentation of EMP project by end of FY 1993.
	Complete conceptual phase of near real-time detection and recognition of electric network instabilities; initiate techniques for coordinated system protection and control.	Continue analysis of techniques for coordination of system protection and control. Initiate advanced stability analysis techniques and continue modeling and simulation studies.	Begin close out of research on near-term system protection and control, and stability analyses for present electric network systems.

III. Electric Energy Systems (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Reliability Research (Cont'd)	Continue to analyze data and develop models for automated energy systems; continue fiber optic applications; continue studies to quantify value of reliable electric service; complete studies on automated distributive and adaptive protection.	Initiate research into optimal control of high voltage systems. Initiate research into integration of renewable energy and storage devices into power systems.	
	$ 2,494	$ 2,434	$ 1,572
Systems and Materials Research	Transfer ambient cable technology to industry.	No Activities.	No Activities.
	Complete development of integrated system including controls; cable handling equipment and special navigation subsystems; conduct at-sea tests along arduous portions of the selected route.	Complete documentation and finish project using prior-year funds.	No Activities.
	Continue studies on conducting polymers. Study aging and long-term degradation at interfaces by in-situ characterization.	Complete feasibility study and plan development of conducting polymers for electric power devices; continue characterization of thin film dielectric polymers; continue pre-breakdown studies of liquid dielectrics; continue investigating toxic species in decomposed insulating gases.	Continue the research on polymers with electrical properties varying from conducting to insulating.
	Continue research on high temperature superconducting power systems including development of conductors and initiate conceptual designs of system components. Continue directed research to develop advanced power generation, storage and distribution technologies.	Continue development of practical high temperature superconductors (HTS) in three forms: wires for high magnetic field applications such as for motors and generators, tapes for low magnetic field applications such as for transmission lines, and thin films for use as an alternative to tapes. Expand R&D on large scale processing methods for HTS materials.	Continue development of practical high temperature superconductors: wires, thin and thick films, etc. and appropriate processes to allow fabrication at industrially-scaled plants.

III. Electric Energy Systems (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Systems and Materials Research (Cont'd)	Evaluate the SMES concept using high temperature superconducting materials.	Expand technology development of HTS components (principally coils for magnets and generators). Initiate research into compact SMES, soliciting innovative concepts that reduce high magnetic field/mechanical stresses. Complete feasibility and preliminary design study.	Continue to develop designs for HTS components.
	Initiate start-up of three HTSC Pilot Centers. ($4,500)	Provide for continuation of HTS Pilot Centers at Argonne, Los Alamos, and Oak Ridge National Labs. ($5,850)	Expand the Pilot Center concept to include more industry participants, through industrial driven cost shared collaboration. This will include projects that develop electric system assessments, and new concepts for operation of the electric network with future penetration of superconductivity devices. ($15,014)
	$ 10,472	$ 11,977	$ 21,761
* Program Direction	Provide for 5 FTEs.	Provide for 5 FTEs.	Provide for 5 FTEs.
	$ 350	$ 488	$ 814
Capital Equipment	No Activities.	No Activities.	Laboratory equipment for molecular analysis and characterizing superconducting materials.
	$ 0	$ 0	$ 900
Electric Energy Systems	$ 24,316	$ 17,828	$ 27,347

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

ELECTRIC ENERGY SYSTEMS AND ENERGY STORAGE SYSTEMS

I. Preface: Energy Storage Systems

The Energy Storage program conducts research and development (through a cooperative effort with National Laboratories, universities and corporate research laboratories) which will assist the private sector in commercialization of new and improved storage technologies. Along with DOE's funding for fuel cells and batteries, approximately 40% of our investment is being provided through cost-shared agreements. Research will focus on proton exchange membrane (PEM) fuel cells and batteries for utility and vehicle applications. In addition, advanced energy storage systems will be developed to improve the efficiency of energy generation and end-use, while enhancing the integration of the nation's renewable energy resources. The program includes international cooperation on the latest technology developments of advanced energy storage systems. Energy storage R&D is focused in the area of mid-term batteries and fuel cells for vehicles, near and mid-term batteries for central and distributed utility applications, and for remote or stand-alone applications. The latter applications will allow constant energy delivery from intermittent renewable energy sources.

II. A. Summary Table: Energy Storage Systems

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Battery Storage	$ 9,438	$ 10,157	$ 11,189	+ 10
Thermal and Chemical Storage	2,050	1,484	1,000	- 32
Program Direction	355	399	417	+ 5
Capital Equipment	27	27	300	+100
Total, Energy Storage Systems	$ 11,868	$ 12,047	$ 12,906	+ 7

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II. B. Major Laboratory and Facility Funding

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Argonne National Laboratory	$ 600	$ 670	$ 500	- 25
Brookhaven National Laboratory	$ 250	$ 200	$ 375	+ 88
Lawrence Berkeley National Laboratory	$ 2,925	$ 3,170	$ 2,000	- 37
Los Alamos National Scientific Laboratory	$ 1,350	$ 1,300	$ 4,000	+208
Oak Ridge National Laboratory	$ 550	$ 225	$ 350	+ 56
Pacific Northwest Laboratory	$ 1,050	$ 900	$ 650	- 28
Sandia National Laboratories	$ 3,506	$ 3,731	$ 3,200	- 14

III. Activity Descriptions: (Row BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Energy Storage Systems			
Battery Storage	Continue research on batteries and electrochemical systems to provide a base for development, including processes of solid and porous electrodes, electrolyte transport, new electrochemical couples, and battery and fuel cell components.	Continue research on electrode morphology transport phenomena and kinetics including in-situ and ex-situ characterization techniques; extend efforts on new catalysts for both cathodic and anodic processes.	Continue research on phenomena governing metal electrocrystalization; develop mathematical models to describe the deterioration processes. Evaluate new improved battery materials including ion conducting ceramics, glasses and polymers; fabricate and test corrosion resistant components for high temperature cells. Continue zinc-air research and initiate work on longer life new cathodes for beta battery systems. Lithium iron sulfide cell technology development is to be funded by the Office of Transportation Systems.
	Continue research on catalytic mechanisms at electrode surfaces.		
	Continue research on conductive ionic solids, dielectrics, polymer membranes, coatings, and composites.	Continue research on components including conductors and separators; continue characterization of coatings and containment materials.	

III. Energy Storage Systems (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Battery Storage (Cont'd)	Continue research on near-ambient temperature high energy density cells.	Identify and initiate research on new electrochemical couples; continue applied research on promising systems including zinc/air.	
	Continue research on new catalysts and electrolytes for fuel cells.	Continue proton exchange membranes (PEM) fuel cell research on catalysts to minimize loadings and maximize power densities; develop and test new non-platinum catalysts.	Continue research on Proton Exchange Membrane (PEM) fuel cells for higher power density, improved thermal management, mass transport and water control.
	Continue core technology development for advanced generation of sodium-sulfur batteries.	Complete core development for high temperature sodium-sulfur batteries; continue development of prototype load-leveling battery.	Continue advanced battery module development.
	Continue at a slower pace development of electrolyte and electrode materials.	Complete component materials development; continue efforts to develop a prototype battery for renewable energy applications.	
	Continue R&D on aluminum-air battery system.	Continue R&D on aluminum-air battery systems.	
	$ 9,436	$ 10,157	$ 11,189
Thermal and Chemical Storage	Perform required reconstitution and clean-up of aquifer test sites in Alabama, Minnesota, and Mississippi. Monitor international progress on developmental activities.	Continue characterization of seasonal energy storage in aquifers and complete project documentation. Monitor international progress on developmental activities.	Move one or more heat and/or cool projects to private sector through a collaborative cost-shared effort.
	Hydrogen activities made comparable to the FY 1991 request.	Activities made comparable to the FY 1991 request.	Fund within the Biofuels and Municipal Waste request.
	SMES activities made comparable to the FY 1991 request.	Activities made comparable to the FY 1991 request.	Incorporate into Electric Energy Systems as part of Superconductivity/Materials Research Activity.
	$ 2,050	$ 1,464	$ 1,000

III. Energy Storage Systems (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Program Direction	Provide for 9 FTEs.	Provide for 5 FTEs.	Provide for 5 FTEs.
	$ 355	$ 398	$ 417
Capital Equipment	Supporting capital equipment for overall Energy Storage program.	Supporting capital equipment for overall Energy Storage program.	Laboratory equipment for analysis of surface phenomena in batteries and fuel cells.
	$ 27	$ 27	$ 300
Energy Storage Systems	$ 11,888	$ 12,047	$ 12,906

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(Obligations in thousands of dollars)

OBJECT CLASS SUMMARY

Electric Energy Systems and Energy Storage Systems

Direct Funding:		FY 1989	FY 1990	FY 1991
11.1	Full-time permanent	$451	$488	$590
11.3	Other than full-time permanent	0	0	0
11.5	Other personnel compensation	46	49	59
11.9	Total personnel compensation	497	537	649
12.1	Civilian personnel benefits	68	54	65
21.0	Travel and transportation of persons	140	295	315
25.0	Other services	36,052	29,061	38,024
31.0	Equipment	27	27	1,200
32.0	Land & structures	0	0	0
Totals		$36,784	$29,974	$40,253

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ENERGY SUPPLY RESEARCH AND DEVELOPMENT

OVERVIEW

NUCLEAR ENERGY R&D

CIVILIAN REACTOR DEVELOPMENT

Nuclear Energy is a vital component of the national energy supply that contributes to national energy stability, security and strength. The objective of the Civilian Reactor Development Program is to ensure that nuclear energy remains a safe, economically competitive and an environmentally acceptable resource that continues to contribute to national energy supply.

To fulfill its essential U.S. energy security role, the Civilian Reactor Development Program will:

(a) Provide visible national support and complementary research and development to foster successful industry-led efforts to ensure the availability of the Light Water Reactor option to meet projected power demands in the near-term.

- o Demonstrate the NRC certification process needed for all advanced reactors through successful certification of an advanced light water reactor (ALWR).
- o Encourage development of improved designs employing the best technology available worldwide and incorporating passive safety features for use in standardized plants for the 1990's.
- o Utilize the results from severe accident, source term and safety technology programs to assist in the removal of institutional barriers currently inhibiting the introduction of ALWR's in the U.S. marketplace.
- o Support industry initiatives through complementary R&D to extend the life of the Nation's existing nuclear powerplants.
- o Provide technical support and analyses of efforts to improve the opportunities for the LWR option.

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(b) Support the certification of the Modular High Temperature Gas Reactor (MHTGR). The MHTGR will continue on a cost-shared basis with emphasis on the commonalities with the New Production Reactor MHTGR development. Completion of program will continue to focus on breakthroughs in economics, safety, and licensability.

(c) The Advanced Liquid Metal Reactor (ALMR) development efforts will be concentrated around the Integral Fast Reactor (IFR) concept, with emphasis on the metal fuel cycle and its potential to provide improved waste management options through the recycling and burning of long-lived radioactive actinide elements.

R&D FACILITIES AND THEIR UTILIZATION

Nuclear Energy's test facilities are essential to technology development requirements for space/terrestrial power systems, advanced reactor systems, isotopic systems and other DOE programs. Safety management and oversight activities continue and reflect the reviews by the National Academy of Sciences and the Department's Advisory Committee for Nuclear Facility Safety. Where applicable, the Institute of Nuclear Power Operations good practices are being incorporated.

Argonne National Laboratory-West facilities will continue to provide metal fuel fabrication, fuel processing operations, and safety tests and performance assessments of metal fuels. U.S. and Japanese steam generator testing will continue at the Energy Technology Engineering Center's Sodium Components Test Installation Facility. The FY 1991 budget assumes commencement of close-out of the Fast Flux Test Facility (FFTF) reactor on April 1, 1990, following Congressional approval. No long-term mission has been identified for that facility in support of space nuclear energy or plutonium 238 production. Studies are underway to determine its future efficacy for other possible uses, such as defense reactor waste burnup of actinides.

ADVANCED RADIOISOTOPE & SPACE REACTOR POWER SYSTEMS

These programs meet the national energy needs for both reactor and isotopic power systems for civilian as well as military space and terrestrial mission applications. Projects are specifically focused on satisfying the needs of NASA and DOD through jointly-sponsored and funded nuclear power system development efforts. The broad electrical power range is from watts to multimegawatts.

These power systems are attractive to mission planners for several reasons: Compactness, high specific power (with respect to both mass and volume), long life, high reliability, survivability, insensitivity to harsh environments, capability for autonomous operation, and independence from operational and logistical constraints. For these reasons, isotope and reactor power systems are considered enabling or enhancing technology by users.

THE ADVANCED RADIOISOTOPE AND SPACE REACTOR PROJECTS

(a) The Radioisotope Thermoelectric Generator (RTG) project, which is currently providing RTG's for use on civilian spacecraft such as NASA's Galileo mission to Jupiter, and the Ulysses mission to explore the polar regions of the sun and outyear NASA missions such as CRAF/CASSINI. RTG's can be designed to provide up to 1 KWe of continuous electrical power for 10 to 20 years;
(b) The Special Applications project, an on-going effort with DOD to develop and provide compact RTG's for use in special purpose terrestrial applications;
(c) The Multimegawatt/Special Power Systems project, which includes the advanced space reactor technologies, for providing megawatts of power for SDIO applications or kilowatts to megawatts of power for other space or terrestrial applications.
(d) The SP-100 Space Reactor project, a joint effort with SDIO and NASA to provide 10's to 100's of KWe for civilian and defense missions. The user agencies have reconfirmed their need and support for the program and an amended Memorandum of Agreement has been signed which establishes firm funding commitments through FY 1994.

Additionally, as in previous years this budget supports the performance of beneficial work for others activities performed on a reimbursable basis including costs associated with the use of facilities and staff resources.

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DEPARTMENT OF ENERGY
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ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

LEAD TABLE

NUCLEAR ENERGY R&D

Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
Light Water Reactors						
Operating	$ 26,464	$ 24,423	$ 24,423	$ 31,500	$ + 7,077	+ 29%
Subtotal	$ 26,464	$ 24,423	$ 24,423	$ 31,500	$ + 7,077	+ 29%
Advanced Reactors R&D						
Operating	$ 72,785A/	$ 56,784	$ 56,784	$ 45,000	$ -11,784	- 21%
Capital Equipment	1,220	1,972	1,972	2,000	+ 28	+ 1%
Subtotal	$ 74,005	$ 58,756	$ 58,756	$ 47,000	$ -11,756	- 20%
Space Reactor Power Systems						
Operating	$ 52,727	$ 21,579	$ 21,579	$ 38,040	$ +16,461	+ 76%
Capital Equipment	1,474	2,426	2,426	2,160	- 266	- 11%
Construction	8,750	7,298	7,298	14,300	+ 7,002	+ 96%
Subtotal	$ 62,951	$ 31,303	$ 31,303	$ 54,500	$ +23,197	+ 74%
Advanced Radioisotope Power Systems						
Operating	$ 30,400	$ 29,777	$ 29,777	$ 55,500	$+25,723	+ 86%
Capital Equipment	3,100	3,944	3,944	6,400	+ 2,456	+ 62%
Construction	2,500	15,321	15,321	13,600	- 1,721	- 11%
Subtotal	$ 36,000	$ 49,042	$ 49,042	$ 75,500	$+26,458	+ 54%

A/ Excludes $1,000K reprogrammed to Facilities.

LEAD TABLE (Continued) Nuclear Energy R&D

Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
Facilities						
Operating	$126,193B/	$155,940	$155,940	$131,078	$-24,862	- 16%
Capital Equipment	4,600	4,043	4,043	2,300	- 1,743	- 43%
Construction	8,825	9,663	9,663	7,112	- 2,551	- 26%
Subtotal	$139,618B/	$169,646	$169,646	$140,490	$-29,156	- 17%
Program Direction						
Operating	$ 8,470C/	$ 8,677	$ 8,677	$ 8,800	$ 123	+ 1%
Subtotal	$ 8,470C/	$ 8,677	$ 8,677	$ 8,800	$+ 123	+ 1%
TOTAL	$347,508D/	$341,847E/	$341,847E/	$357,790	$+15,943	+ 5%
Operating	$317,039	$297,180	$297,180	$309,918	$+12,738	+ 4%
Capital Equipment	10,394	12,385	12,385	12,860	+ 475	+ 4%
Construction	20,075	32,282	32,282	35,012	+ 2,730	+ 8%
Total Program	$347,508	$341,847	$341,847	$357,790	$+15,943	+ 5%
Staffing (FTEs)	113	118	118	118		

Authorization: Sec. 31, P.L. 83-703, Sec. 309(a), P.L. 95-91, and P.L. 96-567

B/ Includes $7,168K reprogramming.
C/ Indicated funding reflects a reduction of $809K to offset a FY 1989 general reduction per the FY 1989 Appropriations Conference Report, Public Law 100-371.
D/ Excludes SBIR.
E/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

NUCLEAR ENERGY R&D

FY 1990 Adjusted Appropriation	$341,847
Adjustments - pay cost supplemental	0
FY 1991 Base	$341,847
Light Water Reactors	
o Proceed with an application to NRC for early site permit	+ 3,000
o Focus activities on cooperative program with industry for the design and development of more passively safe simplified 600 (MW) BWR and PWR plant concepts	+ 2,190
o Complete Severe Accident input for Electric Power Research Institute Requirements Document on passive plants	+ 1,028
o Continue program to establish and demonstrate plant life extension and license renewal to the end of 1993	+ 648
o Continue exploring solutions to other institutional impediments to the development of nuclear powerplants	+ 211

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES (Continued)

NUCLEAR ENERGY R&D

Advanced Reactor R&D	
o Provide for Modular High Temperature Gas Reactor preliminary design, technology development and licensing activities	+ 2,470
o Redirect Liquid Metal Reactor design efforts to focus on safety and licensing issues and utilization of the integrated metal fuel cycle	+ 1,396
o Discontinue Advanced Control Test Operation and robotics activities; continue joint U.S./Japan shielding program using Tower Shielding Facility (TSF) under Facilities program	- 8,040
o Continue priority metal fuel cycle development activities with supplemental international funding	- 8,517
o Initiate nuclear fuel cycle systems analysis and develop an actinide recycle program plan and fuel cycle cost data base	+ 2,000
o Complete Reduced Enrichment for Research and Test Reactors program	- 1,065
Space Reactor Power Systems	
o Continue triagency (DOE/NASA/DOD) SP-100 Space Reactor program in accordance with amended Memorandum of Agreement that commits user agencies and DOE to funding profile through FY 1994	+21,667
o Continue joint DOE/DOD Thermionic Fuel Element Verification Program; conduct studies and technology efforts for specific space or terrestrial applications	+ 1,530
Advanced Radioisotope Power Systems	
o Provide for design, safety testing, fabrication, qualification and production of radioisotope power systems for NASA CRAF/Cassini missions and special purpose DOD terrestrial applications; infrastructure modernization and facility upgrades	+27,247
o Provide for orderly closeout of the Turbine Energy Conversion System program	- 789

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES (Continued)

NUCLEAR ENERGY R&D

Facilities	
o Reflects commencement of close-out of the Fast Flux Test Facility reactor starting in FY 1990, pending Congressional approval	-47,666
o At Argonne National Laboratory, provide metal fuel fabrication, fuel processing, operations and safety tests, and performance assessments of metal fuels	+10,993
o Provide for U.S./Japanese steam generator testing and Sodium Components Test Installation operational reliability upgrades	+ 7,609
o Provide for TSF operations and other management support activities	- 92
Program Direction	
o Provides for 118 Full Time Equivalents	+ 123
FY 1991 Congressional Budget Request	$357,790

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR ENERGY R&D

I. Preface: Light Water Reactors

This Program is part of a nationally coordinated effort to remove the technical, licensing, and institutional impediments to construction and operation of next generation Light Water Reactors (LWR's). The major focus of the program is the Advanced Light Water Reactor (ALWR) program element, which has as its objective the development and certification of standardized improved LWR's for deployment in the 1990's to ensure that nuclear power remains a viable option to satisfy load growth and replacement capacity needs. It serves to demonstrate a viable Nuclear Regulatory Commission (NRC) certification process that can be utilized by other advanced reactor concepts by certification, by the NRC, of an advanced Boiling Water Reactor (BWR) in 1991. It also includes design, development, and certification of more passively safe simplified (600 MW) BWR and PWR plant concepts in 1995. These activities fulfill the Department's commitments to complement the Electric Power Research Institute (EPRI)/Industry work on advanced LWR's. This element also provides for demonstrating the new provision in 10CFR52 on nuclear plant early site permits and resolution of key emergency planning issues.

The second program element, Current and Advanced Light Water Reactor Safety and Licensing Support, provides technology support to the Advanced Light Water Reactor Program. It applies the results of severe accident technology programs to the implementation of NRC's Severe Accident Policy Statement for ALWR's to prevent severe accident issues from forestalling acceptance of ALWRs. It develops technology to support the extension of nuclear powerplant life beyond the current arbitrary 40-year licensing period, and provides the basis for achieving a licensing renewal for a lead plant by 1993. It further explores solutions to other institutional impediments to the deployment of nuclear powerplants.

II. A. Summary Table

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request	% Change
Advanced Light Water Reactors	$17,464	$18,310	$23,500	+28
Current and Advanced Light Water Reactor Safety and Licensing Support	9,000	6,113	8,000	+30
Total, Light Water Reactors	$26,464	$24,423	$31,500	+29

II. B. Major Laboratory and Facility Funding

Idaho National Engineering Laboratory	4,000	1,850	3,000	+62
Sandia National Laboratory	4,000	3,400	4,000	+18

III. Light Water Reactors (continued)

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
Advanced LWR	Substantially complete NRC reviews and evaluation reports on ABWR and APWR safety analyses submittals, leading to NRC Final Design Approval in 1990 and Certification in 1991 for these standard plant designs ($6,500). Complete majority of feasibility tests on key features, and complete arrangements, preliminary construction plans and schedules, and estimated costs for BWR and PWR mid-size (600 MWe) plant concepts; issue comprehensive, industry endorsed requirements/criteria to significantly improve LWR plant constructibility ($8,464). Apply improvements in LWR constructibility and advanced instrumentation and control systems to ALWR designs ($1,000). Complete technology support for development of ALWR Requirements Document that reflects basic design needs/criteria from utility perspective. ($1,500).	Complete NRC interaction on an ALWR leading to 1991 design certification ($3,352). Continue cooperative program with industry (50-50 cost share) on design development and testing for more passively safe mid-size ALWR's. Included is detailed design and testing for reactor coolant system; reactor core design; passive safety systems including primary system depressurization and passive containment heat removal; support auxiliary system; and control room. Support for safety analysis and probabilistic risk assessment ($14,958).	Obtain NRC Final Design Approval for the ABWR and participation in a public hearing process leading to Design Certification. ($500). For one or more 600 MWe simplified passive plant designs selected for 1995 certification, complete between 25% and 40% of detailed designs of plant systems, structures and arrangements. Complete initial issue of overall plant design description, requirments and parameters. Initiate any required verification testing. Reach agreement with NRC on licensing review bases and design certification review schedule. Initiate safety analyses calculations, and preparation of Safety Analysis Report, per agreed schedule (50-50 cost share activity with industry). ($20,000). In a cost sharing activity with industry, proceed with an application to NRC for an early site permit to demonstrate the workability of the new provision in 10CFR52 allowing early site permits, including resolution of key emergency planning issues. ($3,000).
Total, Advanced LWR	$17,464	$18,310	$23,500
Current and Advanced Light Water Reactor Safety and Licensing Support	Complete severe accident analysis input for two standardized designs undergoing certification review by NRC. Develop consensus on severe accident requirements included in the EPRI ALWR Requirements Document. Develop standardization of Probability Risk Assessment methods to implement severe accident policy statement and implementation of NRC toward resolution of outstanding severe accident issues. Provide severe safety goal. Conduct severe accident analysis of mid-size ALWR's. ($4,000).	Provide severe accident technology support for EPRI interaction with NRC on ALWR Utility Requirements Document. Participate in NRC rulemaking for severe accident considerations for ALWR's. Provide Severe Accident Technology support to passive plant activities. ($1,972).	Complete EPRI Requirements Document support regarding NRC interactions for large plant; provide severe accident input for the mid-size passive plant Requirements Document. Provide severe accident assistance to vendors preparing safety analysis. ($3,000).

III. Light Water Reactors (continued)

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
Current and Advanced Light Water Reactor Safety and Licensing Support (cont'd)	Develop and propose technical acceptance criteria to NRC on reactor pressure vessel internals, primary piping, cabling, concrete structures, reactor coolant pumps, and steam generators, and many other key support systems. Develop code cases on inspection, testing, and requalification for operation greater than 40 years. Acceptance criteria and revised code developments are necessary before NRC can finalize the regulatory process on license renewals. The technical requirement for license renewal must be defined before a utility will prepare and submit a lead application. Funding supports a 1991 application for a license extension. ($4,000).	Continue cooperative program with industry (50-50 cost share) on extending plant lifetime leading to lead plant license extension by 1993. Includes support for lead plant applicant and safety analysis report preparation, for continued evaluation of key components (coolant system piping, steam generators, concrete structures), for operational data evaluations and diagnostic system input from current plants, for generic material evaluation on reactor internals and reactor vessels related to degradation of life, and for continued revisions to codes and standards allowing greater than 40-year life. ($3,352).	Continue cooperative program with industry (50-50 cost share) to establish and demonstrate plant life extension and license renewal by the end of 1993. Includes support for lead plant safety analysis and environmental reports and preparation of license renewal application to NRC in June 1991. Also, involves developing and interacting with NRC on technical acceptance criteria on critical safety components and primary system pressure boundaries and structures, leading to issuance of final rule on license renewal in 1991. ($4,000).
	Conduct generic studies and small business activities. Carryout analysis to ensure that regulatory and institutional factors impeding the introduction of ALWR's are being addressed in the ALWR development program. Support passage of licensing reform legislation. Continue analyses of plant economics and performance. ($760)	Continue efforts to ameliorate institutional impediments that prevent use of nuclear power to meet future electricity needs and regulatory and institutional arrangements that are considered necessary by all parties to expedite ALWR implementation. ($788)	Continue efforts to ameliorate institutional impediments that prevent use of nuclear power to meet future electricity needs and regulatory and institutional arrangements that are considered necessary by all parties to expedite ALWR implementation. ($1,000)

III. Light Water Reactors (continued)

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
Current and Advanced Light Water Reactor Safety and Licensing Support (cont'd)	Continue 10 nation extended LOFT bundle examination program (no DOE FY 88 funding - using consortium funds). Complete Chernobyl analysis. ($200)	No activity. ($0)	No Activity. ($0)
Total, Current and ALWR Safety and Licensing Support	$ 9,000	$ 6,113	$ 8,000
Total, Light Water Reactor	$26,464	$24,423	$31,500

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR ENERGY R&D

I. Preface: Advanced Reactor R&D

The Advanced Reactor R&D Program is focused on the certification of the Modular High Temperature Gas Reactor (MHTGR) availability and on development of the Advanced Liquid Metal Reactor (ALMR) and its associated metal fuel cycle, with emphasis on its waste management attributes. ALMR design efforts are being redirected to focus on safety and licensing issues and utilization of the integrated metal fuel cycle and actinide recycle activities.

MHTGR design activities during FY 1991 will lead to completion of the preliminary design in FY 1992, and submittal of the Preliminary Standard Safety Analysis Report to the Nuclear Regulatory Commission (NRC) in early FY 1993. Completion of final design and submittal of the Final Standard Safety Analysis Report to the NRC are scheduled for FY 1995 and FY 1996, respectively. Final design approval is expected in FY 1997. The Department will continue cost-shared development of the MHTGR. All MHTGR design, licensing, and technology efforts are being closely coordinated with the New Production Reactor (NPR) program maximizing approximately $46 million of common technology development activities in FY 1990 and FY 1991. In FY 1990, fuels and technology activities in support of the preliminary design efforts will be continued under cooperative programs with Germany, Switzerland, France, Japan, and the United Kingdom.

The ALMR metal fuel cycle program in FY 1991 will focus on fuel performance, safety analysis and testing, pyrometallurgical process development and the integrated metal fuel cycle demonstration in the Hot Fuel Examination Facility-South (HFEF-S). Synergistic coupling of the ALMR metal fuel cycle with thermal reactor oxide and carbide fuel cycles ((Light Water Reactor and High Temperature Gas Reactor (HTGR)) has the potential to reduce significantly the cost and long-term disposal requirements for high level radioactive nuclear waste. Successful demonstration of the metal fuel pyroprocessing technology and the capability of Liquid Metal Reactors (LMRs) to recycle and consume long-lived actinide elements is a key step toward capturing the economic and environmental benefits of actinide burnup. A systems analysis will be initiated, and an actinide recycle program plan and a fuel cycle cost data base will be developed. Support of the international cooperative R&D work on completion of LMR oxide fuel cycle R&D will continue.

II. A. Summary Table:

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request	% Change
High Temperature Gas Reactor	$19,750	$22,530	$25,000	+11
Liquid Metal Reactor	22,870	11,644	5,000	-57
Fuel Cycle Research and Development	31,385	23,517	17,000	-28
Reduced Enrichment for Research and Test Reactors	0	1,065	0	-100
Total, Advanced Reactor R&D	$74,005	$58,756	$47,000	-20

II. B. Major Laboratory and Facility Funding:

Argonne National Laboratory	$29,230	$19,469	$10,500	-46
Energy Technology Engineering Center	$ 500	$ 0	$ 0	0
Oak Ridge National Laboratory	$14,455	$16,523	$15,800	-6

III. Advanced Reactor R&D

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
High Temperature Gas Reactor (HTGR)	Continued MHTGR technology development efforts ($4,800); preliminary design activities ($9,320); and other activities, including interactions with the NRC leading to preparation of the Preliminary Safety Analysis Report (PSAR) ($1,380). $15,500	Continue technology development efforts ($8,300) and coordinate with NPR work maximizing $17 million of common technology development activities; continue interactions with NRC and complete preliminary design activities in FY 1992 ($10,730). $19,630	Continue technology development efforts ($7,000) and coordinate with NPR work maximizing $29 million of common technology development activities; continue interactions with NRC and complete preliminary design activities in FY 1992 ($14,000). $21,000
	Continued international collaborative programs to reduce costs and time required to acquire necessary HTGR technology. $4,250	Continue international collaborative programs to reduce costs and time to develop HTGR technology. $3,500	Continue international collaborative programs to reduce costs and time to develop HTGR technology. $4,000
Subtotal, HTGR	$19,750	$22,530	$25,000
Liquid Metal Reactor (LMR)	The PRISM design was reevaluated and design modifications added to form the updated plant design criteria for the ALMR design program. A Safety Evaluation Report and licensability letter defining outstanding safety issues published by the NRC serves as a reference base for future ALMR design activities. $12,425	Design and licensing activities will focus on resolving the remaining safety issues raised by the NRC staff in their draft preapplication safety evaluation report, and utilization of the integrated metal fuel cycle and actinide activities. $3,604	Design and licensing activities will focus on resolving the remaining safety issues raised by the NRC staff in their draft preapplication safety evaluation report, and utilization of the integrated metal fuel cycle and actinide activities. $5,000
	Funded one U.S. representative overseas in support of cooperative Japanese and U.S. advanced liquid metal reactor research program activities. $300	This activity is funded under the metal fuels activity in FY 1990. Additional funds are also provided under the Facilities program. $0	This activity will be funded under the fuel cycle R&D and Facilities programs as appropriate. $0

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III. Advanced Reactor R&D

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
Liquid Metal Reactor (LMR) (cont.)	Continued advanced instrumentation and control development efforts, including Advanced Control Test Operation activities at Oak Ridge National Laboratory (ORNL). ($3,000) Continued key concept features and components testing. Activities included pump features testing, seismic testing, and heat removal systems testing. ($2,900) Supported actions to operate Tower Shielding Facility (TSF) for shielding experiments under an extended cooperative program with Power Reactor and Nuclear Fuel Development Corporation (PNC)/Japan. ($1,000) $6,900	Continue advanced instrumentation and control development efforts at ORNL. ($3,604) Conduct shielding experiments under an extended cooperative program with PNC/Japan. ($897) $4,501	Continue joint U.S./Japan shielding program using the TSF under the Facilities program. $0
	Continued an international cooperative effort for collecting reliability and failure operating and event data from existing LMRs ((Fast Flux Test Facility (FFTF), Experimental Breeder Reactor-II (EBR-II), JOYO)) to provide component and system reliability, availability, and maintainability information for MONJU Probabilistic Risk Assessment (PRA) and for U.S. advanced designers. $200	Continue the international cooperative effort for collecting reliability and failure operating and event data from existing LMR's (FFTF, EBR-II, JOYO) to provide component and system reliability, availability, and maintainability information for MONJU PRA and for U.S. advanced designers. $187	Continue program using prior year funds. $0
	Conducted innovative university research in robotics ($1,210). An additional $1.79 million was provided from other activities within Advanced Reactor R&D Nuclear Energy. In conjunction with DOE's Office of Energy Research, participated in the administration of the Department's University Research Program. $1,210	Continue state-of-the-art research and development in robotics. $3,155	No activity. $0
	Continued Nuclear Energy studies, evaluations, and management support activities as necessary. $90	Continue Nuclear Energy studies, evaluations, and management support activities as necessary. $197	Funding for Nuclear Energy studies, evaluations, and management support activities will be provided as appropriate. $0

III. Advanced Reactor R&D

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
Liquid Metal Reactor (LMR) (cont.)	Completed Prototype Fast Reactor (PFR)/Transient Reactor Test Facility (TREAT) test program in cooperation with the U.K. $1,745	No activity. $0	No activity. $0
Subtotal, LMR	$22,870	$11,644	$5,000
Fuel Cycle R&D			
Integral Fast Reactor/Metal Fuel Cycle R&D	Continued priority efforts in metal fuel development focusing on: fuel fabrication and testing to demonstrate fuel performance and full-scale fabrication capability ($7,285); demonstration of metal fuel cycle with pyrometallurgical reprocessed fuel and of advanced waste treatment processes ($5,000); tests of fuel cycle equipment systems and development of a commercial scale fuel cycle facility conceptual design and cost estimate ($4,000); core design efforts ($4,300); engineering support of HFEF-S modifications for demonstrating the metal fuel cycle and laboratory equipment used in support of pyrometallurgical fuel processing technology and fuel performance evaluations ($5,300). $25,885	Continue priority efforts in metal fuel development focusing on: metal fuel performance testing including fabrication development and fuel behavior evaluation ($5,441); pyroprocess development (with Japanese collaboration) ($4,262); fuel safety experiments and analysis ($3,187); core design studies emphasizing actinide self-consumption ($947); and preparation for startup of comprehensive fuel cycle remote operation demonstration, including startup with irradiated fuel ($3,674). Activities also include primary EM pump feature testing, seismic analysis, and inherent safety operational tests ($1,345). Fund one U.S. representative overseas in support of cooperative Japanese and U.S. advanced liquid metal reactor research program activities ($150). $19,006	Continue priority metal fuel cycle development activities with the longer term objective of capturing the significant waste management benefits of actinide recycle. Continue fuel performance testing ($4,000); cooperative pyroprocess development with Japan, and metal fuel cycle demonstration in HFEF-S ($3,000); fuel safety demonstration, and core design and analysis tasks ($3,000). Funding for pyroprocessing efforts will be augmented by funds provided under a contract with Japan. $10,000

III. Advanced Reactor R&D

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
Fuel Cycle R&D (cont.)			
Oxide Fuel Cycle R&D	Continued the collaborative oxide reprocessing development program with Japan/PNC ($5,000). Completed cleanup activities and prepared the Critical Mass Laboratory facility for turnover to the Surplus Facilities Management Program ($500). $5,500	Continue the collaborative oxide reprocessing development program with Japan/PNC. $4,511	Continue the collaborative oxide reprocessing development program with Japan/PNC. $5,000
Actinide Recycle	No activity. $0	No activity. $0	Initiate fuel cycle systems analysis to define and evaluate fuel cycle options to synergistically couple the actinide recycle capability of metal fueled ALMRs to the existing commercial once-through fuel cycle. Develop an actinide recycle program plan that identifies objectives, technology development tasks and implementation actions. Initiate and maintain fuel cycle cost data base for cost analyses using established methodology. Funding for this program will be augmented through support from international and/or other DOE programs. $2,000
Subtotal, Fuel Cycle R&D	$31,385	$23,517	$17,000
Reduced Enrichment for Research and Test Reactor	Overall responsibility and funding for this program was with the Arms Control and Disarmament Agency in FY 1989. $0	DOE will complete convertability studies and analyses, and technology transfer, to support conversion of foreign test reactors to low-enriched uranium fuel. $1,065	Limited assistance to the export licensing process and other activities to assist in conversion of research reactors will be performed in the International Affairs account ($0.3). $0
Subtotal, RERTR	$ 0	$1,065	$ 0
Total, Advanced Reactor R&D	$74,005	$58,756	$47,000

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY
NUCLEAR ENERGY R&D

I. Preface: Space Reactor Power Systems

This activity (formerly entitled Space and Defense Power Systems) fulfills the DOE's charter under the Atomic Energy Act to support other Federal agencies in the design, development, production, and testing of reactor power systems for space and special purpose terrestrial applications. This request includes nuclear energy research funding for generic nuclear energy studies, evaluations, and management support activities. The SP-100 Space Reactor and the Multimegawatt/Special Power Systems Projects are conducted in this activity:

The SP-100 Space Reactor is a triagency effort among DOE, NASA, and DOD to establish the technology readiness of advanced space reactors for missions beginning in the late 1990's. The program was established in 1985 with a reactor demonstration targeted for the early 1990's. Though funding reductions have caused several major program restructurings, both the Strategic Defense Initiative Organization and NASA have recently reconfirmed their commitment to the program by signing an amended Memorandum of Agreement that, commits to a funding profile through FY 1994. In addition, the Air Force is in the middle of an evaluation program to establish their position on space reactor power. Finally, a program review group consisting of senior representatives from each sponsoring agency has been chartered to assess SP-100 objectives, development, approach, and management structure in order to either reconfirm the current program direction or to recommend changes.

Multimegawatt/Special Power Systems includes two major activities:

- In cooperation with SDIO, the Thermionic Fuel Element (TFE) verification project is being pursued as a hardware testing program to address key technical issues which need resolution before thermionics can be considered for future space systems, i.e., MWe or low power systems.

- The Special Reactor Systems activities are concentrated on studies and supporting technology efforts for space or terrestrial applications including safety assessments and design studies for potential multimegawatt space power systems. Also included are improved fuels and materials fabrication techniques that may be applicable to all space reactor systems.

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II. A. Summary Table

Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request	% Change
SP-100 Space Reactor	$55,951	$29,331	$51,000	+74
Multimegawatt/Special Power Systems	7,000	1,972	3,500	+77
Activity Totals	$62,951	$31,303	$54,500	+74

II.B. Major Laboratory and Facility Funding

Argonne National Laboratory	$250	$245	$100	-59
Energy Technology Engineering Center	75	125	280	+124
Idaho National Energy Laboratory	1,355	150	900	+500
Los Alamos National Laboratory	8,475	5,335	6,440	+21
Oak Ridge National Laboratory	2,279	1,870	2,475	+32
Pacific Northwest Laboratory	840	0	0	-100
Sandia National Laboratory	600	265	300	+13
Westinghouse Hanford Company	13,226	10,953	19,440	+77

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III. Activity Descriptions

Program Activity/ Subactivity	FY 1989	FY 1990	FY 1991
SP-100 Space Reactor	Continue Ground Engineering System (GES) program, with DOE, SDIO and NASA FY 89 funding support. The program was restructured and extended to accommodate overall reduced funding from requested levels ($76M vs $143M). The Nuclear Assembly Test was rescheduled to be completed in FY 1994. Completion of the Power Converter and Pump Test (funded by user agencies) was extended to FY 1995.	The approximately 1/3 reduction in DOE funding appropriated will extend completion of the Nuclear Assembly Test one year into FY 1995 in concert with completing the Power Converter and Pump Test in FY 1995.	Continue the restructured GES program with a target of completing the Nuclear Assembly Test and the Power Converter and Pump Test in FY 1995.
	Continue development at national laboratories of key technologies that are essential for technology readiness, e.g., continue fuel pellet production for GES core, continue fuels and materials irradiation testing in EBR-II and Fast Flux Test Facility (FFTF) as well as post irradiation examinations. Continue sensor development, initiate special purpose materials irradiation testing in EBR-II, and complete criticality testing in ZPPR. ($7,817)	Continue development and special studies at national laboratories of key technologies that are essential for technology readiness, e.g., continue fuel pellet and cladding production, continue fuels and materials irradiation testing in FFTF as well as post-irradiation examinations, initiate prototypic fuel pin irradiation testing in FFTF, complete fuels and special purpose materials irradiation testing in EBR-II, and continue sensor development. ($7,382)	Continue development and special studies at national laboratories of key technologies that are essential for technology readiness, e.g., complete fuel pellet production, continue fuel cladding production and initiate assembly of fuel pins for GES core, continue fuels and materials irradiation testing, post-irradiation examinations, and continue sensor development.($11,485)
	Complete Preliminary Safety Analysis Report (PSAR). Award process control system contract. ($1,010)	Initiate test site operating procedures plan and revise PSAR. Complete State and Federal environmental permitting activities. Initiate process for award of safety power system contract. Deliver process control system. ($500)	Complete test site operator training and operating procedures plans. Initiate Final Safety Analysis Report (FSAR) and facility qualification plan for test site operations. ($1,000)

III. Activity Descriptions (Continued)

Program Activity/ Subactivity	FY 1989	FY 1990	FY 1991
SP-100 Space Reactor	Continue site preparations (initiate partial removal of exhaust stack) and test site definitive design. Initiate design of vacuum vessel/system. (Refer to revised Construction Data Sheet 86-H-105 for further explanation and justification). ($8,750)	Continue test site definitive design and initiate vacuum vessel/system design. Refer to revised Construction Data Sheet 86-H-105 for further explanation and justification. ($7,298)	Complete vacuum vessel/system design and award contract. Continue facility definitive design and initiate facility containment and external building modifications. Refer to revised Construction Data Sheet 86-H-105 for further explanation and justification. ($14,300)
	Continue system developer design, analysis, development, and validation testing efforts. Complete GES nuclear assembly preliminary design and initiate test article hardware fabrication for performance validation testing. Continue to provide assistance to GES reactor test site for facility preparations for nuclear assembly testing. Continue nuclear component and subsystem development, fabrication, and assembly for validation testing; conduct nuclear component and subsystem performance and lifetime/reliability validation testing. ($31,280)	Continue system developer system integration efforts and assistance to GES reactor test site for facility modifications for the nuclear assembly test. Continue nuclear component and subsystem development, fabrication and assembly for validation testing; continue nuclear component and subsystem performance and lifetime/reliability validation testing. ($8,035)	Continue system developer system integration efforts and assistance to GES reactor test site for facility modifications for the nuclear assembly test. Continue nuclear component and subsystem development, fabrication and assembly for validation testing; continue nuclear component and subsystem performance and lifetime/reliability validation testing. ($10,125)
	Procurement of capital major equipment needed for GES reactor test site. Continue procurement of equipment necessary for fuel production, component and subsystem fabrication, and assembly and validation testing. ($1,174)	Continue procurement of major capital equipment needed for GES reactor test site and for component and subsystem fabrication, assembly and validation testing. ($2,426)	Continue procurement of capital equipment needed for GES reactor test site and for component and subsystem fabrication, assembly and validation testing. ($2,160)

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III. Activity Descriptions (Continued)

Program Activity/ Subactivity	FY 1989	FY 1990	FY 1991
	Conduct safety audits of system developer efforts, provide technical and programmatic oversight and management, and provide for independent program/safety assessment. Conduct mission studies. ($5,920)	Conduct safety audits of system developer efforts, provide technical and programmatic oversight and management, provide for independent program/safety assessment and continue mission studies. ($3,600)	Conduct safety audits of system developer efforts, provide technical and programmatic oversight and management, provide for independent program/safety assessment and initiate Flight Experiment planning. ($3,930)
Total, SP-100 Space Reactor	$55,951	$29,331	$51,000
Multimegawatt (MMW)/Special Power Systems	Continue the joint SDIO/DOE MMW space reactor and thermionic fuel element (TFE) projects. The MMW space reactor is directed primarily at second phase SDI deployment but could also be applicable to far-term civilian missions. The TFE program is a hardware testing program to resolve by early FY 1993 key technology issues that led to non-selection of thermionics for SP-100.	Continue to manage the MMW space reactor funded only by SDIO; continue the joint SDIO/DOE TFE program on an extended schedule, i.e. end of FY 1993.	Continue joint DOE/SDIO TFE verification program. Initiate specific mission nuclear power system design studies and related technology efforts for space and terrestrial applications.
	Complete SDIO and DOE jointly funded MMW space reactor Phase I system concept contractor efforts in mid FY 1989. Conduct Phase I concept evaluations and select up to three concepts for Phase II development. Continue space reactor technologies efforts that support Phase I concepts and downselection activities. Provide technical, administrative, and programmatic management, oversight, and technology, assessments and/or tests.($4,000)	Although no DOE funding is requested for the joint DOE/SDIO MMW Space Reactor project, SDIO may continue funding with DOE acting as manager for the program.	If MMW space reactor program is continued by SDIO, DOE would continue to manage efforts, with funding for safety assessments coming from DOE's Special Power Systems subactivity.

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III. Activity Descriptions (Continued)

Program Activity/ Subactivity	FY 1989	FY 1990	FY 1991
Multimegawatt/ Special Power Systems	Continue the accelerated irradiation of second set of TFE components in FFTF. Continue design of sheath insulator with applied voltage in FFTF. Continue to irradiate and periodically verify the dimensional stability of uninstrumented fueled emitter specimens in EBR-II. Based on test results and modeling input, continue design and fabrication of prototypic TFE assembly for subsequent real time irradiation in FFTF. ($3,000)	Extend TFE program completion to end of FY 1995. Irradiation and Post Irradiation Examination of some components and fueled emitters will proceed. Testing in TRIGA will continue. ($1,972)	Complete irradiation of TFE component test. Begin TRIGA irradiation of nearly-prototypic TFE. ($2,000)
	No activity.($0)	No activity.($0)	Conduct nuclear reactor power system design studies and related technology assessment activities for specific space or terrestrial mission applications or categories of missions. ($1,500)
Total, MMW/ Special Power Systems	$7,000	$1,972	$3,500
Total, Space Reactor Power Systems	$62,951	$31,303	$84,500

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY
NUCLEAR ENERGY R&D

I. Preface: Advanced Radioisotope Power Systems

This activity (formerly entitled Advanced Nuclear Systems) provides support for radioisotope power source development, demonstration, testing, and production. Radioisotope power sources are the enabling technology for space and terrestrial applications requiring proven, reliable and maintenance-free power supplies capable of producing up to ten kilowatts of power and operating under severe environmental conditions for up to tens of years. Previous missions that have used radioisotope power sources include the Apollo lunar surface scientific packages, Pioneer, Viking, Voyager, and Galileo missions.

Program focus is on the near-term mission requirements of the National Aeronautics and Space Administration (NASA) and Department of Defense (DOD), including the President's new Space Exploration Initiative. The program also includes special terrestrial applications in support of DOD uses for activities on land, in the air, and under the sea, as well as support for NASA's Ulysses mission scheduled for launch in 1990. All these projects are jointly funded by DOE and DOD or NASA. Support is provided for two new FY 1990 NASA program starts -- the Comet Rendezvous Asteroid Flyby (CRAF) and Cassini missions to be launched in FY 1995 and FY 1996, respectively. Support is also provided for long-term NASA Mariner Mark II solar system exploration missions to be launched from the late 1990's to the year 2010, such as the Solar Probe, Comet Nucleus Sample Return, Mars Rover/Sample Return, Mars Penetrator Network, and Saturn Orbiter/Probe. The program maintains the sole national capability and facilities to produce radioisotope power systems, provides for infrastructure modernization and upgrades, and provides funding for generic nuclear energy studies, evaluations, and safety support. Modifications to the Fuels and Materials Examination Facility (FMEF) at Hanford are being made to provide a modern Radioisotope Power System Facility for the assembly and checkout of NASA and DOD power supply units.

The Turbine Energy Conversion System (TECS) program, which has been conducted to provide higher power level radioisotope power sources, is being terminated in FY 1990. FY 1990 funding will provide for an orderly closeout of program activities.

Also included is plutonium-238 scrap recovery and blending, and production of new vintage fuel for upcoming missions. This activity supports timely Department decision making and actions to ensure that adequate strategic inventory is available to meet agency mission requirements. The current plutonium-238 inventory will be exhausted by about FY 1996. New production must be initiated now because of the long production time before material is available for formation into heat source pellets.

II. A. Summary Table

Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request	% Change
Radioisotope Thermoelectric Generators	$25,200	$30,656	$49,900	+63
Turbine Energy Conversion System (TECS)	6,600	789	0	-100
Radioisotope Power System Facility	2,500	15,921	20,500	+29
Special Applications	1,700	1,676	2,100	+25
Plutonium-238 Production	0	0	3,000	+100
Activity Totals	$36,000	$49,042	$75,500	+54

II. B. Major Laboratory and Facility Funding

Ames Laboratory	$545	$550	$550	0
Los Alamos National Laboratory	2,229	2,350	3,800	+62
Mound Plant	475	3,000	5,800	+93
Oak Ridge National Laboratory	5,122	2,900	4,610	+59
Savannah River Plant	5,420	12,910	20,000	+55
Westinghouse Hanford Company	5,230	16,771	21,680	+29

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III. Activity Descriptions

Program Activity/ Subactivity	FY 1989	FY 1990	FY 1991
Radioisotope Thermoelectric Generators (RTGs)	Continue to store and monitor Galileo and Ulysses RTGs. Continue testing of the General Purpose Heat Source Qualification Unit. Perform tests and evaluation of Ulysses RTGs. Ship Galileo RTGs to Kennedy Space Center and provide launch support. Complete preparation of the updated Galileo Final Safety Analysis Report (FSAR) required to obtain launch approval. Start preparation of Ulysses FSAR.($5,500)	Store and monitor Ulysses RTGs. Ship Ulysses RTGs to Kennedy Space Center and support Galileo and Ulysses launches. Continue testing of the Qualification Unit in order to confirm power predictions. Complete Ulysses FSAR and provide support to safety review process and obtain launch approval.($4,500)	Support Ulysses launch and return spare RTG to Mound for storage and monitoring. Continue testing of Qualification Unit and initiate disassembly for CRAF and Cassini mission use. ($1,300)
	Develop engineering systems design data and prepare Memorandum of Agreement with NASA to provide RTGs for the CRAF and Cassini missions.($100)	Complete selection process for system contractor for CRAF and Cassini flight programs. Conduct RTG design and safety activities. Initiate heat source materials and component production qualification activities. Provide heat source safety test hardware.($900)	Conduct CRAF/Cassini design activities and initiate preparation of Preliminary Safety Analysis Report. Conduct supporting production qualification and safety testing activities at LANL and elsewhere. Initiate qualification of RTG converter production line and produce initial components. Attain production level quantities of heat source materials and components. ($12,700)
	Initiate startup of plutonium-238 fuel pellet fabrication and encapsulation production capability to provide new isotope heat sources to power NASA and DOD missions.($5,300)	Continue startup of production capability, including design, facility reconditioning and equipment modifications, safety analysis, and safety/environmental/ safeguards upgrades. Upgrade procedures to accommodate new vintage fuel. Continue isotope heat source pellet fabrication and qualification.($11,600)	Continue fuel pellet fabrication and encapsulation line design, reconditioning, modification, qualification, and processing activities to meet NASA CRAF/Cassini launch schedules.($16,500)

III. Activity Descriptions (Continued)

Program Activity/ Subactivity	FY 1989	FY 1990	FY 1991
Radioisotope Thermoelectric Generators (RTGs)	Provide mission support through safety analysis and testing. Provide reliability and quality assurance oversight. Conduct a basic engineering/safety development and assessment program to evaluate RTG materials and designs, including Modular (MOD)-RTG design. Conduct improved thermoelectric and heat source materials (e.g., clad, insulator, impact shell, aeroshell) development and qualification program. Operate and maintain essential facilities including heat source assembly and checkout support. Initiate procurement of state-of-the-art shipping container for radioisotope power systems.($14,300)	Provide mission support through safety analysis and testing. Provide reliability and quality assurance oversight. Conduct a basic engineering safety development and assessment program to evaluate RTG materials and designs including MOD-RTG. Conduct improved thermoelectric and heat source materials (e.g., clad, insulator, impact shell, aeroshell) development and qualification program. Operate and maintain essential facilities, including heat source assembly and checkout support. Initiate design and development of shipping container.($13,656)	Provide mission support through safety analysis and testing. Provide reliability and quality assurance oversight. Conduct a basic engineering/safety development and assessment program to evaluate RTG materials and designs including MOD-RTG. Conduct MOD-RTG design and qualification program. Conduct improved thermoelectric and heat source materials (e.g., clad, insulator, impact shell, aeroshell) development and qualification program. Operate and maintain essential facilities, including heat source production, assembly, and checkout support. Complete design and initiate certification of shipping container.($19,400)
Subtotal, RTGs	$25,200	$30,656	$49,900

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III. Activity Descriptions (Continued)

Program Activity/ Subactivity	FY 1989	FY 1990	FY 1991
Turbine Energy Conversion System	Continue system design, safety analyses, reliability and quality assurance. Provide integration options for potential applications. Perform detailed design and trade-off studies for critical components. Procure and initiate life-cycle testing of selected heat source and turbine-alternator-compressor subcomponents. ($6,600)	Provide for orderly program and contract closeout, including securing design packages and related documentation. ($799)	No Activity. ($0)
Subtotal, TECS	$6,600	$799	$ 0

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- Continuing efforts to ensure the Department's radiation protection program for the public and the environment meets all DOE-internal and other agency protection requirements.
- Supporting the Department's effort to update and implement the Environmental Restoration and Waste Management Five Year Plan and the Research, Development, Demonstration, Testing and Evaluation Plan.
- Analyzing future environmental requirements applicable to DOE operations.

II. A. Summary Table

Activity	FY 1989	FY 1990	FY 1991	% Change
Environmental Guidance				
Regulatory Review & Analysis	$700	$800	$1,000	25
Environmental Guidance Development	1,500	3,000	3,500	17
Subtotal	$2,200	$3,800	$4,500	18
Environmental Compliance				
RCRA Compliance Support	$850	$1,500	$2,000	33
CERCLA Compliance Support	700	1,800	2,000	11
Other Oversight Support	550	1,300	1,500	15
Subtotal	$2,100	$4,600	$5,500	20
Total	$4,300	$8,400	$10,000	19

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory	$1,077	$2,100	$2,500	19
Oak Ridge National Laboratory	750	1,500	1,800	20
Pacific Northwest Laboratory	2,050	4,000	4,800	20

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III. Activity Description

FY 1989	FY 1990	FY 1991
Regulatory Review & Analysis		
Continue Regulatory Review System to provide thorough and timely review and comment on regulations impacting on DOE. Update selected reference books. ($700)	Continue Regulatory Review System. Priorities include land disposal restrictions, treatment, storage, and disposal facility location standards; residual radioactivity guidelines; low-level radioactive waste disposal; spent transuranic waste disposal; and national emission standards for radionuclides. Update RCRA, AEA and other reference books. ($800)	Continue Regulatory Review System. The number of legislation/regulation packages requiring review and analysis has been on the increase over the past few years, and it is expected that there would be as many in FY 1991. Priorities will still be focused on RCRA, CERCLA, waste management and oil disposal, and radiation protection. Update select reference books. ($1,000)
Environmental Guidance Development		
Issue four DOE environmental Orders: DOE 5400.XX, Radiation Protection; DOE 5400.1, the General Environmental Protection Order; DOE 5400.YY, CERCLA Programs; and DOE 5400.3, Hazardous and Mixed Waste Program. Finalize a DOE groundwater protection strategy. Develop and issue a NEPA/CERCLA integration policy. Begin developing CERCLA RI/FS and Title III workshops. Continue scientific and technical reviews of radiation standards. ($1,500)	Develop and implement training program on all environmental statutes for DOE managers and staff. Review available standards to develop guidance on possible cleanup standards and work with EPA to understand the scientific basis for these standards. Develop guidance stemming from FY 1989 RCRA reauthorization. Continue workshops for CERCLA RI/FS activities, Title III, and RCRA requirements. Issue further CERCLA and RCRA guidance. Issue the DOE Orders on radioactive emission effluent and surveillance monitoring requirements and	Continue to work with EPA and other Federal agencies on the scientific basis of environmental standards. Continue to develop DOE policies/guidance for new regulations/ legislation. Improved workshop training programs would be developed. Workshops would be given for high-priority topics at additional locations. Additional cost-shared workshops on high-priority topics would be conducted in cooperation with EPA. The number of legislation/

FY 1989	FY 1990	FY 1991
	groundwater protection strategy. Finalize new orders on SARA Title III and DOE cleanup standards. Develop training to accompany issuance of DOE Radiation Protection Order and Emission Effluent Order. Continue scientific and technical reviews of radiation standards. ($3,000)	regulation packages requiring guidance/ training has been on the increase over the past few years, and it is expected that there would be as many in FY 1991. Priorities will still be focused on RCRA, CERCLA, waste management and disposal, and radiation protection. Continue scientific and technical reviews of radiation standards. ($3,500)
RCRA Compliance Support		
Develop technical/ regulatory strategies for attaining RCRA compliance for mixed waste units and for maintaining compliance with new RCRA requirements such as land ban and corrective action. Support negotiations and oversee Federal Facility compliance and cleanup agreements with regulatory agencies. ($850)	Ensure implementation of technical/ regulatory strategies for attaining RCRA compliance for mixed waste through support for negotiations and oversight of Federal Facility compliance and cleanup agreements. Review RCRA corrective action and closure documents. Assist program and field offices in development and implementation of site-specific guidance and training on RCRA requirements such as land ban. Support Five-Year Planning for RCRA compliance activities. ($1,500)	Ensure implementation of technical/ regulatory strategies for attaining RCRA compliance for mixed waste through support for negotiations and oversight of Federal Facility compliance and cleanup agreements. Review RCRA corrective action and closure documents. Assist in implementation of site-specific guidance and training on RCRA requirements such as land ban and corrective action. Support for Five Year Planning for RCRA compliance activities. Review and coordinate delisting petitions and land ban variances. ($2,000)

FY 1989	FY 1990	FY 1991
CERCLA Compliance Support		
Preliminary Assessment/Site Inspection scoring support to continue. Remedial investigation/ feasibility studies initiated. Continue to negotiate and oversee CERCLA/120 Interagency Agreements for major defense facilities. ($700)	Remedial investigation/ feasibility study support will increase significantly over FY 1989 due to increased number of studies underway. Identify/develop risk assessment methodologies to support preparation/review of the remedial investigation and feasibility studies. Provide technical support to the highest priority sites for preparation and approval of Records of Decision for remedy selection. Increase level of effort to support CERCLA/SARA Section 120 Interagency Agreements for all major facilities. Identify and resolve CERCLA Compliance issues. Provide site specific assessments of the impact of land ban provisions on cleanup wastes. Support Five Year Planning for cleanup. ($1,800)	Continue technical support for remedial investigation/ feasibility studies, and Records of Decision for remedy selection. Continue support for negotiation of CERCLA 120 Interagency Agreements for all major facilities. Identify and resolve CERCLA compliance issues. Assist facilities to comply with land ban requirements for cleanup wastes. Support Five-Year Planning for cleanup. Provide oversight of CERCLA cleanups to ensure compliance with CERCLA compliance agreement commitments. ($2,000)
Other Oversight Support		
Initiate contractor support for in-house efforts to inventory EPA/State inspections; enforcement action monitoring support; review of FY 1988 environmental monitoring reports to evaluate improvements; continued analysis of air and water compliance status and issues. Support for DOE Five Year Planning, the Environmental	Assist in the update and oversight of implementation of the Five Year Plans for compliance activities (CWA, TSCA, CAA). Review FY 1989 environmental monitoring reports. Support for A-106 planning process. Oversee follow-up of Environmental Audits and Environmental Tiger Teams' assessments. Continued analysis and resolution of air and	Assist in the update and oversight of implementation of the Five Year Plans. Review FY 1990 environmental monitoring reports. Support for A-106 Planning Process. Oversee follow-up of findings from Environmental Audit and Tiger Teams' assessments. Continued analysis of and technical support for air and

FY 1989	FY 1990	FY 1991
Activities Reporting System, and A-106 planning. Review and oversight of Environmental Survey Action Plans and Environmental Audits. ($550)	groundwater compliance issues. Air and water enforcement action monitoring support continued. Oversight of compliance with DOE Orders on environmental and radiation protection. Technical support for DOE-wide integration of environmental programs, including corrective actions. Assist in development and implementation of training program on all environmental statutes for DOE managers and staff. ($1,300)	water compliance issues and monitoring of enforcement actions. Oversight of compliance with DOE Orders on environmental and radiation protection. Implementation of air and water compliance actions. Increased support for High Level Waste Repository and New Production Reactor compliance issues. Conduct compliance reviews of all major facilities. ($1,500)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

Environment, Safety and Health

I. Preface: NEPA Project Assistance

This program supports the timely implementation of the Department's proposed actions by assuring compliance with the National Environmental Policy Act (NEPA) and related environmental review requirements that are necessary prior to project commitment. The Office is responsible for the oversight of NEPA-related activities in all DOE program areas, covering the full range of energy technologies and environmental issues. Because compliance with NEPA is a prerequisite to implementation of most of the Department's programs and projects, timely and adequate NEPA documents are critical to the attainment of the Department's program objectives. The Office of NEPA Project Assistance performs a variety of NEPA assurance and project assistance functions which fall into two major categories: NEPA Document Review and NEPA Policy and Guidance. Document Review involves several activities, including review of highly-complex project documents for technical adequacy and accuracy; application of scientific methodology; review of Department projects and programs for potential applicability of NEPA and related environmental review requirements (e.g., endangered species, wetlands and floodplain protection, historical and archaeological sites, etc.); technical assistance in the preparation of NEPA and related environmental documents (e.g., environmental assessments and environmental impact statements) and litigation support; independent review of NEPA and related environmental documents; and coordination with other Federal agencies. NEPA Policy and Guidance involves the preparation and distribution of NEPA compliance policy documents and notices, guidance memoranda and manuals, project management coordination for Major Systems Acquisition projects, program office compliance assessments, and NEPA compliance workshops for program office personnel.

The FY 1991 Target level workload for NEPA review is expected to increase significantly as a result of the Secretary's Ten Point Initiative and generally commensurate with the project development activities of the Department. This workload is determined by the demands of the DOE program offices for routine NEPA support and oversight services, and includes new projects and facilities as well as modifications to existing facilities. Program areas include Defense Programs (e.g., new facilities, modifications to existing facilities, waste management facilities); Nuclear Energy (e.g., new reactor technologies, uranium mill tailings remedial actions, cleanup of surplus facilities and formerly-utilized sites); Fossil Energy (e.g., innovative technologies, petroleum reserves development, asset divestiture); power marketing policy and transmission line projects; energy research (e.g., high-energy physics projects, magnetic fusion, particle

accelerators); regulatory projects; conservation and renewable energy projects, financial assistance projects, and international activities.

Substantial work is anticipated in response to several new and highly complex activities such as the New Production Reactor and the Innovative Clean Coal Technology Program, safety improvements and the NEPA requirements of the Defense Programs (DP) Modernization effort begun during FY 1990. This work involves both highly-complex programmatic and site-wide NEPA documentation as well as multiple project-specific NEPA reviews. Because many of the Defense Programs facilities subject to modernization were completed pre-NEPA, there is no existing NEPA documentation on which to rely as modernization of those facilities begins. Therefore, any substantial change in those facilities is likely to trigger the need for NEPA documentation.

In NEPA Policy and Guidance, the baseline workload consists primarily of updates to existing guidance materials (e.g., the NEPA Guidance Manual and Categorical Exclusions list), production of new materials (e.g., policy guidance memoranda on major NEPA issues), presentation of NEPA compliance workshops to Headquarters and operations office personnel, and coordination of Major Systems Acquisition projects. In addition, the Secretary has directed as part of his Ten Point Initiatives for Environmental Compliance and Waste Management that the Department conduct Environmental Compliance Assessments of DOE facilities and revise its NEPA procedures and establish a uniform policy and procedures for implementing NEPA. Major emphasis will be placed on this effort in FY 1990 and FY 1991.

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II. A. Summary Table

Activity	FY 1989	FY 1990	FY 1991	% Change
NEPA Document Review	$1,800	$3,200	$4,000	25
NEPA Policy & Guidance	1,100	1,500	2,000	33
Total	$2,900	$4,700	$6,000	28

II. B. Major Laboratory and Facility Funding

Martin-Marietta	$790	$790	$1,250	58
Battelle Memorial Institute	250	450	465	3
Argonne National Laboratory	50	250	260	4

III. Activity Description

FY 1989	FY 1990	FY 1991
NEPA Document Review		
Complete an estimated 150-170 major reviews of EAs and EISs and about 200 other NEPA-related actions, including determinations of the level of NEPA documentation required in the full range of DOE programs and projects in all DOE program and technology areas including Defense Programs (DP); UMTRA and FUSRAP projects; Power Marketing, Conservation, and Petroleum reserves projects; nuclear energy; energy research advanced technology projects; and Economic Regulatory Administration projects; provide full NEPA technical review and support to major ongoing and highly-complex projects such as Innovative Clean Coal Technology Program (ICCTP), New Production Reactor (NPR) capacity, various decontamination and decommissioning projects (e.g., Hanford eight surplus reactors) major site cleanup NEPA/CERCLA compliance documents, renovation and replacement projects (e.g., Fernald renovation), various waste management and disposal projects (e.g., WIPP) and new construction projects. Provide litigation support as needed.	Complete an estimated 160-170 major reviews of EAs and EISs and over 200 other NEPA-related actions, including determinations of the level of NEPA documentation required in the full range of DOE programs and projects in all DOE program and technology areas including DP projects; UMTRA and FUSRAP projects; Power Marketing, Conservation, and Petroleum reserves projects; nuclear energy; energy research advanced technology projects; Economic Regulatory Administration projects; provide basic NEPA technical review and support to major ongoing and highly-complex projects such as Innovative Clean Coal Technology Program (ICCTP), New Production Reactor (NPR) capacity, major site cleanup NEPA/CERCLA compliance documents, and various DP decontamination and decommissioning projects (e.g., Hanford eight reactors), renovation and replacement projects (e.g., Fernald renovation, Savannah River Plant (SRP) FB production line), various environmental restoration, corrective action projects,	Complete an estimated 160-180 major reviews of EAs and EISs and over 200 other NEPA-related actions, including determinations of the level of NEPA documentation required in the full range of DOE programs and projects in all DOE program and technology areas. Provide full NEPA technical review and support to major ongoing and highly-complex projects. Provide full litigation support as needed. Provide full NEPA review support to Defense Program Modernization Program. ($4,000)

FY 1989	FY 1990	FY 1991
($1,800)	incinerator and other waste management projects (e.g., those identified in the 5-year plan), and new construction projects. Provide litigation support as needed. ($3,200)	
NEPA Policy and Guidance		
Continue NEPA-related policy, guidance and assistance actions; complete additions to NEPA categorical exclusions; begin comprehensive "Tiger Team" survey of DOE NEPA compliance systems at all DOE Program Offices and Operations Offices; continue project coordination for all Major Systems Acquisition projects; finalize NEPA Compliance Guide; conduct NEPA compliance workshops with headquarters and Operations Offices to improve NEPA document quality and production efficiency; produce guidance memoranda, as necessary. ($1,100)	Continue NEPA-related policy, guidance and assistance actions; continue comprehensive "Tiger Team" survey of DOE NEPA compliance systems at all DOE Program Offices and Operations Offices; continue project coordination for all Major Systems Acquisition projects; continue NEPA compliance workshops with headquarters and Operations Offices to improve NEPA document quality and production efficiency; produce guidance memoranda, as necessary. ($1,500)	Continue NEPA-related policy, guidance and assistance actions; continue comprehensive "Tiger Team" survey of NEPA compliance procedures at all DOE Program Offices and Operations Offices; continue project coordination for all Major Systems Acquisition projects; continue NEPA compliance workshops with headquarters and Operations Offices to improve NEPA document quality and production efficiency; design and implement NEPA compliance training program; produce guidance memoranda, as necessary. ($2,000)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

Environment, Safety and Health

I. Preface: Environmental Analysis

The Environmental Analysis Program provides responsive analyses and options development with respect to significant environmental issues that affect national energy supply, demand and prices. This mission is accomplished by the analysis and coordination of energy-related environmental issues to assure the full development and assessment of policy options in DOE decisions affecting U.S. energy systems and in development of associated policies and programs.

In FY 1991, the program will emphasize the effects of potential global climate change, air quality and waste issues on the energy industry. Global Issues Assessments, the largest outlay topic, will continue development of greenhouse gas emissions data, forecasting model improvements, evaluation of mitigation and energy adaptation strategies and effects, and increased analytical support to the Intergovernmental Panel on Climate Change (IPCC) and other associated international bodies. With the completion of the National Acid Precipitation Assessment Program (NAPAP) in FY 1990, decreased acid rain analysis outlays will be limited to the evaluation of the effects of implementing issues related to emission reductions and technology innovation. Other analysis of air quality issues include ambient air standards, source performance standards, air toxics, indoor air quality, and emerging regional air issues. Strengthened analysis and intradepartmental coordination of impacts of Clean Air Act amendments, the Comprehensive Response, Compensation and Liability Act reauthorization, and other waste issues is required. Technology data and models utilized for emerging issues and the National Energy Strategy environmental assessments will be maintained.

A broad range of contacts are maintained by the program within and outside the Department. The Program coordinates activities with other Federal agencies, key Congressional staff, international groups involved in environmental studies and policy development, and private interests. Cognizance of activities of Congressional Members and Committees is included.

II. A. Summary Table

Activity	FY 1989	FY 1990	FY 1991	% Change
A. Program Activity				
Global Issues Assessments	$3,000	$1,100	$1,400	27
Acid Rain/Interagency Research	700	700	200	-71
Emerging Issues/Assessments	830	630	900	43
Technology Characterizations	460	600	500	-17
Subtotal	$4,990	$3,030	$3,000	-1
Energy Industry Regulatory Analysis				
Analysis of Environmental Laws	$405	$450	$1,050	133
Analysis of Environmental Regulations	605	760	1,350	78
Subtotal	$1,010	$1,210	$2,400	98
Total	$6,000	$4,240	$5,400	27
II. B. Major Laboratory and Facility Funding				
Argonne National Laboratory	1,765	1,700	2,220	31
Brookhaven National Laboratory	160	250	300	20
Oak Ridge National Laboratory	900	700	895	28
Lawrence Berkeley Laboratory	575	325	375	15
Pacific Northwest Laboratory	715	325	375	15
U.Cal-Davis/SERI	300	--	--	--
National Academy of Sciences	505	--	--	--
Headquarters	880	785	885	13
Undesignated	200	155	250	61
Total	6,000	4,240	5,400	27

III. Activity Description

FY 1989	FY 1990	FY 1991
Global Issues Assessments		
Funds will be used to conduct the following studies as directed by Congress: Alternative Energy Research & Development Study; Carbon Dioxide Inventory and Policy Study; Greenhouse Gas Data Collection Study; and Study of Options to Mobilize the Private Sector. ($3,000)	Conduct global pollutant interagency studies, including greenhouse gas emissions projections and technology assessments; climate change mitigation strategy evaluation, and climate change effects. Continue greenhouse gas emissions model development. Conduct analyses in support of U.S. position at meetings of Intergovernmental Panel on Climate Change (IPCC). Conduct a series of effects assessments. ($1,100)	Continue global pollutant interagency studies, including greenhouse gas emissions projections and technology assessments; climate change mitigation strategy evaluation, and climate change effects. Continue greenhouse gas emissions model development. Increase analyses in support of U.S. position at meetings of Intergovernmental Panel on Climate Change (IPCC). Conduct a series of technology effects assessments. ($1,400)
Acid Rain/Interagency Research		
Continue interagency National Acid Precipitation Assessment Program, and risk/benefit analysis capabilities. ($700)	Complete interagency National Acid Rain Precipitation Assessment Program. Continue study of ozone and nitrogen oxides effects and controls. ($700)	Continue study of ozone and nitrogen oxides effects and controls. Conduct analyses of implementation issues. ($200)
Emerging Issues/Assessments		
Continue Departmental acid rain, tropospheric and stratospheric ozone strategies, and indoor air	Continue Departmental acid rain	Continue Departmental assessments

FY 1989	FY 1990	FY 1991
quality assessments. ($830)	assessments and analyses of emerging regional air issues and indoor air quality. Reduced waste issues assessment. ($630)	and analyses of emerging regional air issues, air toxics, and indoor air quality. Enhance waste issue assessment. ($900)
Technology Characterization		
Continue industrial energy data, National Energy Policy Plan, and transportation/ fuels assessments. Complete environmental models. Initiate development of international greenhouse gas emissions data base and continue emissions forecasting models. ($460)	Perform industrial energy data, Integrated Energy Strategy, topics analysis, and transportation/ fuels assessments. Expand background coverage for emerging issues. ($600)	Continue industrial energy data and National Energy Strategy assessments. Maintain background data and model development efforts for emerging issues and Clean Coal Advisory Board Support. ($500)
Energy Industry Regulatory Analysis		
Analysis of Environmental Laws		
Evaluation of amendments to the Clean Air Act, reauthorization of the Resource Conservation and Recovery Act and EPA stratospheric ozone depletion rules. ($405)	Carry out analyses of the increased implementation of the Clean Air Act and Resource Conservation and Recovery Act provisions; conduct evaluations of potential amendments to the Clean Water Act and the Safe Drinking Water Act. ($450)	Increased analyses of revised Clean Air Act; reauthorization of the Comprehensive Environmental Response, Compensation, and Liability Act. ($1,050)
Analysis of Environmental Regulations		
Continued analysis of rulemakings affecting energy industries and	Continued analysis of expanded rulemakings affecting energy	Enhance the analysis of Resource Conservation and Recovery Act

FY 1989	FY 1990	FY 1991
national energy supply and demand for the Surface Mining Control and Reclamation Act, the Clean Air Act, the Resource Conservation and Recovery Act, Superfund codification, and groundwater proposals. ($605)	industries and national energy supply and demand for the Resource Conservation and recovery Act, the Surface Mining Control and Reclamation Act, Clean Air Act, and groundwater proposals. ($760)	rulemakings specific to offshore and arctic oil and gas exploration and production. Conduct specific options analyses associated with energy efficiency. ($1,350)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

Environment, Safety and Health

I. Preface: Office of Medical Director

The Medical Director has Departmental responsibility for providing independent Occupational Medicine program oversight to assure that contractor employees at DOE government-owned, contractor-operated facilities are provided medical care within Department standards and that the occupational health of DOE contractor employees is protected from operational hazards.

The DOE Fitness-for-Duty Program, The Personnel Assurance Program, the Personnel Security Assurance Program, and the Drug Free Workplace Program will continue to be supported by the Medical Director's Office. The frequency of reviews of field offices and contractor Occupational Medicine programs will be increased; psychological applications for assessment of human reliability in highly diversified nuclear and operational activities will be expanded; human reliability programs will be developed or updated; a human factors program will be developed; education and training activities will be significantly increased and strengthened; and an occupational health tracking system will be updated and implemented.

II. A. Summary Table

Activity	FY 1989	FY 1990	FY 1991	% Change
Occupational Medical Reviews	$225	$425	$425	0
Psychological Assessment Program Policy Standards, & Quality Assurance	180	180	100	-44
Medical Evaluation for Human Reliability Programs	150	150	150	0
Working Group for Occupational Medical Issues & Technical Assistance	70	70	75	7
Education & Training in Medical Area	75	75	150	100
Total	$700	$900	$900	0

II. B. Major Laboratory and Facility Funding

Hanford Environmental Health Foundation	$700	$900	$900	0

III. Activity Description

FY 1989	FY 1990	FY 1991
Occupational Medical Reviews and Appraisals		
Conducted 20 onsite reviews and appraisals of contractor occupational medicine programs. In addition, 4 special appraisals of psychological assessment programs such as personnel assurance program, fitness for duty program, etc. ($225)	Conduct 23 physician on-site reviews per year, providing a two year cycle. Conduct 7 special appraisals of psychological assessment programs. Conduct 10 interim medical reviews to follow up occupational medical appraisal recommendations and where a change in contractor occurs. ($425)	Same as FY 1990. ($425)
Psychological Assessment Program, Policy, Standards, & Quality Assurance		
Developed a draft of a DOE Order for Psychological Applications Program Standards. ($180)	Explore effective approaches for the application of modern psychological principles to employees involved in the highly diversified nuclear and operational activities. Develop a DOE-wide Psychological Applications Program for various contractor organizations. In Addition, Technical Assistance for DOE Draft Order for the Psychological Assessment Program Policy, Standards, and Quality Assurance. Develop a users manual for health information system and protocol for	FY 1990. Continue program implementation work in Field, Laboratories and Plants. Develop Implementation guidelines, continue comprehensive site visits and orientation meetings with the Medical Directors. Initiate a program evaluation for first-year effectiveness, including cost-benefit analysis & overall contribution to operational Health and Safety. Provide Quality Assurance Guidelines for DOE

FY 1989	FY 1990	FY 1991
	psychological program reviews. ($180)	contractor O.M. Depts. Provide psychological support to Employee Assistance Program with emphasis in areas of Drug and Alcohol Abuse. ($100)
Medical Evaluation Program For Human Reliability		
Developed high-speed computerized scoring for MMPI, 16 Personality Factor psychological assessment instruments, modified for use in Human Reliability Programs assessments. ($150)	Continue to assume responsibility for all the medical components of all DOE Human Reliability Programs, i.e., medical and psychological assessments, substance abuse (drug and alcohol), and rehabilitation. Develop quality assurance methods for the medical aspects of Human Reliability Programs. ($150)	Same as FY 1990. In addition, initiate a program evaluation including a cost-benefit analysis and overall contribution to operational health and safety ($150).
Occupational Medical Issues and Technical Assistance		
Provided a mechanism for the timely consideration of occupational medical issues of immediate concern to DOE. Ad hoc working groups of professionals and specialists are brought together to address specific issues. Complete rewrite of the EH Contractor Occupational Medical Program Order (5480.8) and development of medical standards. ($70)	Continue to provide a mechanism for the timely consideration of occupational medical issues of immediate concern to DOE ($70).	Same as FY 1990. ($75)

FY 1989	FY 1990	FY 1991
Education and Training in the Medical Area		
Developed DOE policy on Emerging Radiation Treatment. Initiated development of education and training programs for Operations Offices and contractor staff to conduct the medical and psychological assessment aspects of new human reliability programs. ($75)	Continue development and implementation of education and training programs to prepare personnel for the conduct of the medical and psychological assessment aspects of new human reliability initiatives. The medical standards for Human Reliability Programs will be established. Support for training programs in medical management and treatment in radiation accidents. ($75)	Same as FY 1990. In addition, initiate a program evaluation including a cost benefit analysis and overall contribution to operational health and safety. ($150)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

Environment, Safety and Health

I. Preface: Safety Appraisals

The Office of Safety Appraisals provides independent oversight to assure that DOE's non-nuclear and non-reactor nuclear safety responsibilities are properly fulfilled. This oversight responsibility includes conducting independent appraisals, reviews, and technical evaluations of the operation and management of DOE's facilities. Recent Technical Safety Appraisals, safety analyses, design reviews, and other reviews of nuclear safety issues have revealed the continuing need for increased oversight and major upgrades at a number of DOE facilities.

The Department has made a commitment to enhance the safety of its operations. The primary objective of the Safety Appraisal Program is to evaluate the overall safety performance (exclusive of nuclear reactor and non-reactor nuclear safety) of DOE line management and contractors in high hazard and select moderate hazard facilities. With the strengthening of DOE line management to make them directly responsible for the safety of operations under their purview, the Safety Appraisal program will transition from a program with heavy emphasis on direct contractor oversight to a program focusing on DOE line managements' safety programs and their effectiveness at implementing DOE safety policy. The transition will include EH training support and assistance to DOE line management to enable them to assume direct oversight of contractor operations, activities, and performance. Once the transition is completed, the EH role will be to monitor and confirm line organization performance, as evidenced by contractor and field office performance, and to provide timely feedback to the Secretary. An important element of the EH program will be the conduct of multidisciplinary team safety appraisals, management reviews, functional appraisals and other engineering assessment/audits as necessary of contractor and field office operations in order to verify compliance with Departmental safety policies, standards, guidance, and good practices. Follow-up activities to ensure that deficiencies found in these and previous appraisals have been corrected are included in this program. The proposed budget is based on the use of smaller overall appraisal team sizes and focused on "smart" appraisal plans, i.e., use of performance indicators to pre-determine areas not in need of evaluation.

A second element of the Safety Appraisal Program includes efforts to improve the overall quality of facility safety analyses and the translation of these safety analyses into contractually enforceable Operational Safety Requirements. These efforts include detailed technical reviews of selected Safety Analysis Reports

and related Operational Safety Requirements for high hazard and select moderate hazard non-nuclear facilities; proposed changes, tests, or experiments involving unreviewed safety questions; major construction projects and Major Systems Acquisitions. These efforts will also include audits of the field office safety analysis audits dealing with identified major safety concerns at existing facilities. Special technical evaluations and reviews will be made of the safety concerns at existing facilities.

II. A. Summary Table

Activity	FY 1989	FY 1990	FY 1991	% Change
Multidisciplinary Team Safety Appraisals & Reviews	$9,750	$15,500	$15,000	-3
Safety Analysis and Review Systems	2,500	2,533	2,500	-1
Total	$12,250	$18,033	$17,500	-3

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory	$200	$250	$225	-10
Brookhaven National Laboratory	1,295	1,500	1,300	-13
Lawrence Livermore National Laboratory	645	1,640	900	-45
Los Alamos National Laboratory	416	700	550	-21
Oak Ridge National Laboratory	977	927	900	-3
Pacific Northwest Laboratory	525	1,075	1,050	-2
Idaho National Engineering Laboratory	2,349	4,315	2,500	-42

III. Activity Description

FY 1989	FY 1990	FY 1991
Multidisciplinary Team Safety Appraisals and Reviews		
Conduct 23 team safety appraisals including follow-up appraisals for the FY 1988 and FY 1989 appraisals. ($9,750)	Conduct 25 team safety appraisals including follow-up appraisals. ($15,500)	Conduct 24 team safety appraisals including TSAs, follow-up appraisals and unscheduled technical reviews. ($15,000)

FY 1989	FY 1990	FY 1991
Safety Analysis and Review Systems (SARS) Appraisals		
Conduct 7 SARS appraisals. Also conduct limited SARS appraisals of 2 new high hazard and 1 moderate hazard nonreactor nuclear facilities. ($2,500)	Conduct 12 SARS appraisals for existing reactors and high hazard nonreactor nuclear facilities. Conduct SARS appraisals for 3 new high hazard and select moderate facilities. ($2,533)	Conduct 8 SARS appraisals for selected high and moderate hazard non-nuclear facilities. ($2,500)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

Environment, Safety and Health

1. Preface: Safety Compliance

The overall mission of the Office of Safety Compliance (OSC) is to develop and implement programs that provide an overall diagnostic assessment of DOE line management's safety program performance at DOE facilities and operations. OSC integrates and analyzes evaluations of the overall safety performance of DOE line management and their operating contractors. This will be accomplished by implementing a Performance Measurement and Monitoring Program which entails the development of performance measurement criteria and performance indicators; methods for diagnosing root causes; evaluations of safety and health corrective actions; and trend analyses to identify and correct potential safety problems. The Performance Measurement and Monitoring Program will also monitor safety and health corrective actions and improvements.

OSC will continue to utilize the Unusual Occurrence Date Base but will not be responsible for its maintenance. In doing so, statistical and engineering analyses will be performed to determine trends that require management attention and lessons to be applied to DOE operations. The Office will develop and disseminate safety and health information by various means affecting Departmental organizational elements.

OSC manages the development of system safety techniques that improve the safety programs of DOE contractors, including DOE-wide safety and health training programs to inform and educate DOE personnel on these techniques and their application.

II. A. Summary Table

Activity	FY 1989	FY 1990	FY 1991	% Change
Performance Measuring & Monitoring Program	$350	$1,150	$1,150	0
Unusual Occurrence Data Base	150	300	--	-100
System Safety Techniques	600	840	1,000	19
Technical Support	--	--	50	--
Total	$1,100	$2,290	$2,200	-4

II. B. Major Laboratory and Facility Funding

Brookhaven National Laboratory	175	400	400	0
Idaho National Engineering Laboratory	675	1,500	1,750	17

III. Activity Description

FY 1989	FY 1990	FY 1991
Performance Measuring and Monitoring Program		
A safety and health Performance Indicator (PI) program was initiated. Data collection from six DOE facilities selected for the trial program. Based on this trial modify the PI program as needed. Continue the program evaluation and enhancements including development of risk based PI's and management indicators. Develop statistical techniques for analyzing the PI data. Implement the PI program for DOE high hazard nuclear facilities. ($350)	Extend the PI Program to all DOE facilities including moderate hazard facilities. Establish systematic ways of reporting the PI data, develop detailed guidance, conduct trend analyses applying statistical tests and demonstrate the use of PI's for DOE management in making decisions concerning safety oversight. ($1,150)	Fourteen (14) performance indicators will be measured at all the DOE high hazard facilities and at selected moderate hazard facilities (176). Data will be up-loaded into the computer once per month. Data analysis will be performed, and quarterly and annual reports will be issued. Assist and train DOE field offices and contractors in using the PI program. ($1,150)

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FY 1989	FY 1990	FY 1991
Unusual Occurrence Data Base		
Provide data entry and analysis of unusual occurrences and accidents and disseminate observations and lessons learned from data to field. ($150)	Continue operation of the UOR data base and conduct a study to refine and expand analysis of UOR data from several DOE sites to provide more useful information to both program and field operations. ($300)	No activity. ($0)
System Safety Techniques		
Provide approximately 3,000 student-days of training on the Management Oversight Risk Tree (MORT) Seminar, Accident Investigation Workshop, Actuarial Risk Workshop, Operational Readiness Seminar, Classification of Recordable Accidents Workshop, and Task Analysis/ Procedures Workshop. Develop training courses for Root Cause Analysis and MORT for Managers. ($600)	Provide approximately 3,500 student-days of training on the existing MORT Seminar, Accident Investigation Workshop, Actuarial Risk Workshop, Operational Readiness Seminar, Classification of Recordable Accidents Workshop, and Task Analysis/ Procedures Workshop. Develop appraisal training course for members of Technical Safety Appraisals (TSA). Conduct approximately 500 student-days of training/tutoring in new courses on Root Cause Analysis, MORT for Managers, and TSA Methodologies. Revise the Classification of Recordable Accidents Workshop to reflect conversion to electronic notification and reporting. ($840)	Provide approximately 4,000 student-days of training/tutoring on the existing MORT Seminar, Accident Investigation Workshop, Task Analysis/Procedures Workshop, Actuarial Risk Workshop, Operational Readiness Seminar, Classification of Recordable Accidents Workshop, Root Cause Analysis, MORT for Managers, and TSA Methodologies. Develop and pilot a new course on Advanced MORT Applications. ($1,000)

FY 1989	FY 1990	FY 1991
Technical Support		
No activity. ($0)	No activity. ($0)	Provide contractor support for writing safety bulletins, reviewing and analyzing accident investigations reports and for follow-up on corrective actions resulting from Technical Safety Appraisals and other reviews. ($50)

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

Environment, Safety and Health

I. Preface: Quality Programs

The focal point for safety-related quality assurance (QA), non-nuclear safety expertise, and on-site monitoring of safety (exclusive of nuclear reactor and non-reactor nuclear safety) in the Department is the Office of Quality Programs. Areas of safety that are within the purview of the Office of Quality Programs include fire protection, industrial safety, aircraft safety, industrial hygiene, explosive safety, packaging and transportation safety, firearms safety, dam safety, and non-radiation safety aspects relevant to epidemiology programs. Functions of Quality Programs include: (1) establishing and coordinating DOE QA policy; (2) conducting and assuring the quality of non-nuclear aspects of safety appraisals and assessments of contractor, field and Headquarters activities to obtain independent verification that Department activities are being conducted in a safe manner; (3) establishing technical bases for policy and standards in non-nuclear safety areas; (4) sponsoring safety-related seminars and training courses; and (5) monitoring day-to-day activities at nuclear facilities through site residents.

The program of appraisals of important Department non-nuclear facilities (begun in FY 1989) will be expanded to accomplish annual appraisals of non-nuclear safety issues at high hazard and moderate hazard facilities, whether exempt or non-exempt, from OSHA. Technical support will also be provided to the Safety Appraisals Program. These oversight activities will include the capability to perform special diagnostic appraisals that are focused specifically in response to deficiencies identified during multidisciplinary team appraisals, employee complaints, accident investigations, Environmental Surveys, data analyses, etc. Emphasis will be placed on determining the root cause of problems or failures. In line with the Secretary's initiatives, an objective of these activities will be to ensure that the Department is in compliance with applicable OSHA and DOE standards in the execution of policy.

In addition to the activities described above, this office implements the on-site resident program. This initiative follows a National Academy of Sciences recommendation that the Headquarters Environment, Safety and Health oversight staff should have a permanent and significant on-site presence. Residents on-site are responsible for making technical observations to assure that issues and problems are promptly brought to DOE management's attention for resolution. An on-site presence has been established at Rocky Flats Plant, Savannah River Site, Oak Ridge, Idaho, Richland and at several Ohio facilities, with plans to staff key

additional sites. This program requires an outlay of operating dollars to provide evaluations in technical areas not requiring dedicated on-site resources, and for training of residents.

II. A. Summary Table

Activity	FY 1989	FY 1990	FY 1991	% Change
Non-nuclear Overview & Appraisals	$1,950	$6,478	$1,935	-70
Support to Safety Appraisals and Unscheduled Inspections	400	850	3,100	265
Quality Assurance Support	450	450	--	-100
Safety and Health Protection	3,200	2,500	3,165	27
Total	$6,000	$10,278	$8,200	-20

II. B. Major Laboratory and Facility Funding

Brookhaven National Laboratory	$450	$420	$420	0
Pacific Northwest Laboratory	100	250	250	0
Idaho National Engineering Laboratory	1,100	1,690	1,690	0
Lawrence Livermore National Laboratory	325	250	250	0
Los Alamos National Laboratory	710	2,200	2,200	0
Oak Ridge National Laboratory	550	550	550	0

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III. Activity Description

FY 1989	FY 1990	FY 1991
Functional Appraisals		
Develop and initiate a pilot program for structured and integrated safety appraisals for non-nuclear facilities. Two pilot appraisals of a multidisciplinary nature similar to those performed at DOE nuclear facilities were conducted. Several appraisals were also conducted covering single disciplines. ($1,950)	Assess the pilot program and enhance or modify as necessary. Initiate annual appraisals at half the 14 DOE high hazard non-nuclear facilities, and 20 percent of the 30 moderate-hazard facilities. Improve non-nuclear safety performance criteria for appraisals and develop training requirements for safety professionals based upon lessons learned from OSHA participation in three 1989 Tiger Team inspections. Implement training requirements for DOE and contractor employees. ($6,478)	Appraise 25 facilities exempt from OSHA in selected non-nuclear safety areas involving public and worker safety. Review 10 high hazard non-exempt facilities. Conduct 10 oversight appraisals of Program Office and Field Office safety programs. ($1,935)
Support to Safety Appraisals and Unscheduled Inspections		
Provide QA support to the conduct of multidisciplinary safety appraisals, operational readiness reviews, and various technical projects. ($400)	Perform approximately 10 multi-disciplinary diagnostic Quality Verification appraisals. ($850)	Participate in approximately 30 multi-disciplinary, safety appraisals. Conduct an estimated 20 unscheduled quality verification inspections. ($3,100)
Quality Assurance Support		
Monitor and assess QA requirements imposed by program and field organizations on contractors, and assess the variability of quality	Continue to assess the variability of QA requirements imposed by	No activity. ($0)

FY 1989	FY 1990	FY 1991
assurance practices among DOE field offices and operating contractors. Take initial steps to assure DOE organizational elements apply QA policies and standards consistently and uniformly. Assess practices for ensuring that systems and components that are important to safety undergo appropriate engineering analyses and testing. Review major system acquisitions and major projects to ensure QA adequacy. ($450)	program and field organizations on contractors. Complete development of policy guidance for each field element that will help assure QA standards are applied consistently and uniformly. Assess practices and procedures for ensuring systems and components important to safety undergo appropriate engineering analyses and testing. ($450)	
Safety and Health Protection		
Improve hazard communication network, including notification of workers exposed to hazardous materials, worker safety and enforcement programs, fire protection, dam safety, packaging and transportation appraisals, aircraft safety, firearms safety, respiratory protection, transportation safety and hazard evaluations of explosives used in DOE operations. Publish guidelines. Supplement site resident technical capabilities, provide site resident training, and support restart of reactors at Savannah River Plant and plutonium processing at Rocky Flats. Provide support for safety and	Include hazard communication network and technical support for EH site resident inspection. ($2,500)	Improve criteria for assessing contractor, field office and program office management of non-nuclear safety areas. Update hazardous chemical exposure consequence data base. Evaluate non-radiological workplace hazards and incident experience for lessons to be learned in such areas as industrial safety, construction safety, industrial hygiene, fire protection, packaging and transportation, aviation safety, firearms safety, electrical safety and explosive safety. Apply those lessons learned to appraisals, guidance documents and training, the sharing of safety information and

FY 1989	FY 1990	FY 1991
quality assurance conferences and training courses. ($3,200)		for implementing lessons learned. Assist the staff in evaluations of variance and exemption requests for relief from non-nuclear agency safety requirements. Supplement site resident inspection skills for special inspections, and provide training to maintain and expand resident inspection skills. Implement non-radiological epidemiology safety findings in such areas as beryllium and asbestos control. ($3,165)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

Environment, Safety and Health

I. Preface: Safety Policy and Standards

The overall mission of the Office of Safety Policy and Standards (OSPS) is to assure the adequacy and the timely issuance of DOE non-nuclear safety, radiological protection, and emergency preparedness policies and standards. The OSPS is the central point for coordination within DOE and for liaison with other agencies and groups in the development of related regulations, standards, and requirements, and resolution of issues applicable to DOE operations, including review of proposed statutes, regulations, standards, and requirements for their application to and potential impact on DOE activities. The OSPS also oversees and provides technical support to DOE's operational radiation protection programs. The OSPS also has responsibility for DOE emergency preparedness policy and order development, and oversight of DOE emergency planning and preparedness programs.

The currency and soundness of the Department's non-nuclear safety requirements are an essential basis to effective performance of the self-regulatory role. OSPS is a focused organizational function for safety policy development, including the need to assure effective implementation of the Occupational Safety & Health Act (OSHA) at DOE facilities. The scope and content of DOE safety orders, standards, and guidelines are being evaluated and revised on an ongoing basis to assure their adequacy. This entails identifying safety policy gaps, inadequacies, and issues; evaluating available options; developing directives and standards, providing guidelines for implementation, and monitoring their effectiveness in application. In addition to prescribing acceptable safety performance, policies are developed for safety review and decisionmaking, including performance of safety analyses, and notification and reporting.

As part of the Radiation Protection Activity, the Office of Safety Policy and Standards conducts the DOE Laboratory Accreditation Program (DOELAP) and applied health physics research and development. DOELAP is designed to improve worker radiation protection through independent verification and certification of DOE capabilities for radiological monitoring and assessment. Applied health physics research and development is focused solely on solving operational problems identified by internal and external reviews of DOE sites.

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II. A. Summary Table

Activity	FY 1989	FY 1990	FY 1991	% Change
Develop & Revise Safety Policies	$1,765	$2,010	$500	-75
Standards Implementation	300	250	--	-100
Risk Assessment	1,770	2,065	--	-100
Human Performance	700	1,000	--	-100
Radiation Protection	4,850	5,730	2,921	-49
Safety Training & Accreditation	2,765	3,515	--	-100
DOE National Emergency Response Capability	7,700	8,000	--	-100
Total	19,850	22,570	3,421	-85

II. B. Major Laboratory and Facility Funding

Brookhaven National	$1,570	$2,045	$0	-100
Argonne National Laboratory	190	110	0	-100
Lawrence Livermore National Laboratory	1,610	1,500	0	-100
Los Alamos National Laboratory	180	390	0	-100
Oak Ridge National Laboratory	180	100	0	-100
Nevada Operations Office	5,863	6,175	0	-100
Pacific Northwest Laboratory	3,600	5,175	2,821	-45
Idaho National Engineering Laboratory	4,055	5,150	200	-96
Idaho Operations Office (RESL)	--	400	400	0

III. Activity Description

FY 1989	FY 1990	FY 1991
Develop and Revise Safety Policies		
Develop orders and field implementation guidance for: safety objectives, severe accident/PRA, radiation protection, training accreditation, emergency preparedness and operations, and nuclear facility design and operations. Develop new policies regarding nuclear facility maintenance, human factors, safety compliance, SARs, and others based on nuclear safety program needs and experience. ($1,765)	Continue to develop new and revised policies, orders, and implementation guidance based on the DOE safety objectives policy, assessments of accepted or evolving commercial regulatory practices, and DOE-wide deficiencies and policy needs. Priority will be directed to policies related to DOE Class A reactors and high and selected moderate-hazard nuclear facilities. Includes requirements and guidance for reconstituting design bases for key DOE nuclear facilities, upgrading site specific operating procedures, and nuclear facility modification and upgrade determinations on a case-by-case basis. ($2,010)	Develop Orders for radiation protection, nuclear and nonnuclear facility emergency preparedness, occupational safety and other disciplines pertinent to non-nuclear facility safety. ($500)

FY 1989	FY 1990	FY 1991
Standards Implementation		
Assess Industry Standards/Experience		
Conduct assessments of effectiveness and validity of existing safety requirements based on feedback from field appraisals and experience, consistency with DOE safety objectives and recognized national/ international practices, and recommendations of external advisory committees and expert groups. ($300)	Complete assessment of effectiveness and validity of existing safety requirements based on feedback from external advisory committees, NRC regulations and standards, and safety issues from DOE field safety appraisals and commercial nuclear power industry experience. Determine applicability to DOE facilities, request reviews by the line programs, and recommend DOE Order changes, as appropriate. ($250)	No activity. ($0)
Risk Assessment		
Established independent probabilistic risk assessment (PRA) review teams for Class A reactors to provide feedback that assures PRAs are complete, accurate and able to satisfy risk management objectives. Initiated component failure and human error data evaluation and collection for PRA. Conducted PRA workshops and training. ($1,770)	Provide independent PRA review of SRP, N, HFIR, HFBR and ATR reactors; initiate reviews of EBR II and FFTF reactors; assist in SRP restart; and initiate non-reactor PRA reviews. Develop recommendations for component failure and human error evaluation programs. Expand PRA training. ($2,065)	No activity. ($0)

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FY 1989	FY 1990	FY 1991
Human Performance (Formerly Contractor Self-Improvement)		
Human Performance Evaluation		
Efforts conducted to enhance sharing of safety information among contractors; determined urgent need to focus on DOE human performance issues. Program planning completed. ($400)	Initiate development of a Human Performance Evaluation System modeled after successful programs in the nuclear industry. The program will include initiating the development of methods for identification of human error situations, root cause analysis methodology, and a feed back system for sharing actual human performance experience and solutions. ($350)	No activity. ($0)
PERFORM Program		
Initiated the PERFORM Program to identify DOE human performance issues, performance cause and effect relationships, and performance indicators and standards specifically related to major DOE nuclear facilities. ($300)	Continue program and develop human performance appraisal techniques and methodologies to promote contractor self improvement. Develop procedures that ensure human performance is adequately considered during design and operations of DOE nuclear facilities through the safety appraisal and oversight process. ($650)	No activity. ($0)

FY 1989	FY 1990	FY 1991
Radiation Protection		
Health Physics Support and Assistance		
Performed three health physics appraisals of major DOE sites and identified upgrades. Provided consultation, support and assistance to field operations with regard to health physics technology and performance issues. Developed codes of good practice for health physics in the workplace. Revised and issued new DOE Order 5480.11, "Radiological Protection for Occupational Workers." ($2,450)	Continue to conduct health physics appraisals of DOE nuclear sites. Provide technical support and assistance to field operations and operating contractors, resulting in [illegible] grades of radiation [illegible]n programs across DOE. C[illegible]nue to develop and train DOE and contractor personnel on good health physics practices and procedures. Develop guidance and standards for self-improvement. ($2,565)	Conduct two radiological protection appraisals of line programs and operating contractors, and review facility restarts. ($456)
DOE Laboratory Accreditation Program (DOELAP)		
Continued development of DOE Laboratory Accreditation Program, including dosimetry, bioassay, calibration, and instrumentation. Developed instrumentation and calibration accreditation program. Initiated qualification and performance test program for portable instruments. ($900)	Maintain and operate DOE Laboratory Accreditation Program. Maintain the Dosimetry Accreditation Program, continue prototype testing of the Bioassay Accreditation Program, and continue development of the internal dosimetry, extremity dosimetry, and instrument calibration accreditation programs. ($1,050)	Maintain and operate DOELAP. Bioassay program development will be completed. Continue development of extremity dosimetry and instrument calibration program. ($1,050)
Radiological Emergency Planning		
Provided health physics technical support and assistance in the area	Same as FY 1989. In addition, provide health physics technical	No activity. ($0)

FY 1989	FY 1990	FY 1991
of guidance and standards development and, in particular, support the Department in fulfilling its role under the Federal Radiological Emergency Response Plan. Coordinate emergency planning within DOE and with other Federal agencies with regard to public radiation protection. ($500)	support and assistance for the development of inplant, onsite, and off-site guidance and standards; field appraisal assistance; and development of protective action guidance. ($600)	
Health Physics Research and Development		
Improved worker monitoring capability and assessment of radiation dose. Efforts centered on personnel neutron dosimeter evaluation and upgrade, beta measurement and spectrometer development, internal dosimetry model, and reference-man data base development. Work also included Track-Etch Dosimeter evaluation. Neutron Field Spectrometer development, and Total Effective Dose Equivalent system. ($1,000)	Continue to improve worker monitoring capability and assessment of radiation dose. Emphasis placed on resolving problems identified by internal and external safety appraisals. Specific areas include: reducing missed neutron dose due to poor detector sensitivities; improve the methodology for organ dose determination; develop measurement techniques for internally deposited radionuclides focusing on both sensitivity and process time; and improve instruments and techniques for evaluation of beta doses, especially cases where beta dose exceeds gamma dose. ($1,000)	Continue to improve worker monitoring capability and assessment of radiation dose. Emphasis placed on resolving problems identified by internal and external safety appraisals. Specific areas include: reducing missed neutron dose due to poor detector sensitivities; improve the methodology for organ dose determination; develop measurement techniques for internally deposited radionuclides focusing on both sensitivity and process time; and improve instruments and techniques for evaluation of beta doses, especially cases where beta dose exceeds gamma dose. ($1,000)
Implementation of Radiation Protection Order/Standards		
DOE Order 5480.11, "Radiological	Considerable activity devoted to	Activity reoriented to provide

FY 1989	FY 1990	FY 1991
Protection of Occupational Workers," was issued January 1, 1989. Preliminary reviews of contractor plans to implement the Order were initiated. ($0)	the review of contractor plans to implement DOE Order 5480.11, with implementation guidance provided to field operations. All DOE operating contractors are to complete activities to implement the Order by December 31, 1989. All Operating contractors will not be able to implement DOE Order by end of CY 1989. Effort necessary to review requests and justifications for extensions. ($515)	oversight and appraisals of line program and contractor implementation of DOE Order 5480.11. ($415)
Safety Training & Accreditation		
Completed the development of the Training Accreditation Program modeled after the Institute of Nuclear Power Operations commercial program, including accreditation performance objectives and criteria, performance-based training methodology, training courses, and establishment of an accreditation process and accrediting board. Completed good practices for maintenance training, crisis management training, SARA/OSHA instructional materials, and radiation protection training. Conducted 45 courses covering instructor training, on-the-job training, performance based training, criticality safety, and human factors; conducted 16 workshops for reactor and nuclear	Conduct programs in the field supportive of new training policies and implementation requirements. Administration of the program consists of training accreditation and cross-cutting DOE-wide coordination programs that are equivalent to commercially licensed nuclear plant programs. Includes the accreditation of over 300 training programs at Category A reactors (8) and selected non-reactor nuclear facilities (40) covering operating, maintenance, and support personnel. Program also includes coordination of activities through the Department's Memorandum of Agreement with INPO, development of training program content guides and generic training materials, training courses, and workshops for operating contractors	No Activity. ($0)

FY 1989	FY 1990	FY 1991
facility operator, maintenance, emergency preparedness, industrial hygiene, and radiation protection training managers. Provided program evaluations and assistance to DOE operating contractors. ($2,765)	and the systematic exchange of lessons learned among DOE line program offices, filed offices, and operating contractors. ($3,515)	
DOE National Emergency Response Capability		
Aerial Measurement System		
Operated and maintained the Aerial Measurement System. Conducted a major field exercise. Began planning for a major command post exercise of the Federal Emergency Response Plan, which is applicable to the full range of radiological emergencies. ($5,875)	Begin to restore contractor personnel capability lost due to the constant funding levels for past 3 years in order to operate and maintain the Aerial Measurement System at minimum level of preparedness. ($6,175)	No Activity. ($0)

FY 1989	FY 1990	FY 1991
Atmospheric Release Advisory Capability (ARAC)		
Maintained the ARAC system capability for DOE and DOD sites. ($1,500)	Continue to maintain the ARAC system capability under a shared funding agreement with the Department of Defense. ($1,500)	No Activity. ($0)
Radiological Assistance Response Plans		
Supported the Brookhaven National Laboratory radiological assistance plan. BNL provided advice and assistance on radiological emergency preparedness matters to state an local officials in 11 northeastern states. Supported the Argonne National Laboratory radiological assistance plan. Argonne National Laboratory provided assistance to state and local officials in 10 upper midwestern states. ($325)	Continue Brookhaven National Laboratory and Argonne National Laboratory radiological assistance plan support. ($325)	No activity. ($0)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

Environment, Safety and Health

I. Preface: Facility Operator Training and Assistance Program

FOTAP supports facility personnel training programs through provision of facility-specific resources to develop performance based training for operations and support personnel. In addition, a graduate fellowship program to provide the requisite professional/technical capability to DOE and its operating contractors in radiation protection has been included as a long term effort to attract and recruit professional radiation protection engineers and scientists.

FOTAP will augment ongoing initiatives to systematically implement performance-based training development approaches at non-reactor nuclear and non-nuclear facilities.

II. A. Summary Table

Activity	FY 1989	FY 1990	FY 1991	% Change
Facility-Specific Training	--	$1,120	$3,550	217
Graduate Fellowship	--	750	850	13
Total	--	$1,870	$4,400	135

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III. Activity Description

FY 1989	FY 1990	FY 1991
Facility-Specific Training		
Planning and development of the Facility Operator Training and Assistance Program was completed. ($0)	The Department's Facility Specific Training program, is applicable to Category A reactors (8) and high and selected moderate hazard nonreactor nuclear facilities (about 40). During FY 1990, emphasis will be placed on radiation protection training for workers and upgrade of training programs. ($1,120)	Complete work initiated in FY 1990 on Radiation Protection training for workers. Complete establishment of an OSHA training accreditation program in line with the Secretary's OSHA related initiatives and provide line program assistance in implementation. ($3,550)
Graduate Fellowship	Provide for continuing education opportunities for professional health physicists and nuclear graduate program and field assignments at DOE facilities. ($750)	Provide accredited continuing education opportunities for college graduates in the radiation protection/health physics field resulting in DOE operations assignments. ($850)
No activity. ($0)		

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

Environment, Safety and Health

I. Preface: Planning and Information Resources Management

Commensurate with the priorities reflecting the importance of protecting the environment, ensuring safe operations and maintaining the health of workers and the public, is the need for an integrated ES&H Information System. The current EH system is available on-line to over 500 DOE and contractor registered users. It uses the Safety Performance Measurement System (SPMS), to provide access to ten separate modules including the Computer Assisted Tracking System (CATS), the Computerized Accident/Incident Reporting System (CAIRS), the Unusual Occurrence Reporting System (UOR), the Radiation Exposure Module (REM), the Chemical Hazards Emergency Management System (CHEMS) and the Standards Information Management System (SIMS). These modules are being more completely integrated and pertinent site ES&H data will be added directly to provide on-line reporting capabilities. Site personnel and Office staff will work from the same comprehensive data set to identify ES&H actions and report compliance. Other data bases currently maintained by EH, DP, and EPA will be integrated to provide efficient coordination of basic data. Continued management and administration of the information system is a necessary step toward improving the efficiency of control and use of available resources. The Office will continue to meet its responsibilities under DOE Order 1330.1E "Management of Automated Systems and Data Resources." The functions that are centralized are those associated with the management of the entire assembly of procedures, operations, computer software and hardware, needed for system operation and quality assurance and those functions needed to control the flow of information from source to user.

II. A. Summary Table

Activity	FY 1989	FY 1990	FY 1991	% Change
Information Resources Management	$3,190	$3,000	$3,000	0
Planning	--	740	1,100	49
Total	$3,190	$3,740	$4,100	10

II. B. Major Laboratory and Facility Funding

Idaho National Laboratory	$2,200	$2,800	$2,900

III. Activity Description

FY 1989	FY 1990	FY 1991
Information Resources Management		
Centralize management and integration of information systems involved with the evaluation of ES&H performance and the oversight of ES&H programs. Complete enhancements to CATS for listing/display of EH Orders and notices, safety policy/guidance, EH Site resident reports, independent fire surveys, and revised appraisal schedule formats and reports. Complete planning and initial development for the Health Information System (HES), the Nuclear Facilities Incidents (NFI) database, and the Performance Indicator (PI) system. ($3,190)	Operate, integrate, maintain, and enhance existing system. Add interfaces to other EH and identified DP and EPA databases. Continue development of Health Information System (HES). Continue enhancements to CATS to support the Secretary's environmental compliance assessment initiative, policy development and guidance, and tracking of environmental audit and Corrective Activities. ($3,000)	Operate, integrate, and maintain, and enhance existing systems. Develop passive automated programs to cross-analyze databases to identify adverse ES&H trends and patterns, deteriorating performance, common equipment problems, and other issues. Merge CAIRS and UORS into a single database. Complete the conversion from hardcopy reporting to electronic reporting. Support through CATS the Secretary's environmental compliance assessment initiative. ($3,000)
Planning		
No activity. ($0)	Direct support to and oversight of environment, safety and health related planning activities. ($740)	Same as FY 1990. Continue direct support to and oversight of environment, safety and health related planning activities. ($1,100)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

Environment, Safety and Health

I. Preface: Program Direction

The Program Direction account provides funds for salaries, benefits, and travel of the staff complement of the Office of Environment, Safety and Health, as well as funds for support contracts that furnish centralized administrative and technical services to the full range of office functions.
The FY 1991 staffing request is 269 FTEs. This request is in direct support of the Secretary's Five Year Planning activities and the Secretary's Ten-Point initiatives for environmental compliance and waste management, to conduct independent "tiger team" assessments directed by the Secretary, and to conduct, at the Secretary's direction, a Department-wide NEPA assessment and to develop a NEPA strategy.

Funds are also required to support the expanded safety program responsibilities including safety appraisals, safety compliance, quality assurance, safety standards development, and the continued staffing of the on-site resident program. Increased emphasis will be: to evaluate the overall safety performance (exclusive of nuclear reactor and non-reactor nuclear safety) of DOE line management and contractors in high hazard and select moderate hazard facilities; to continue to improve the overall quality of facility safety analyses and the translation of these safety analyses into contractually enforceable operational safety requirements; to continue development and implementation of programs that provide an overall diagnostic assessment of DOE line management's safety program performance at DOE facilities and operations; to continue audits of the DOE Quality Assurance programs at field offices and contractor sites and to continue the onsite resident program; to continue development of safety orders for radiation protection, nuclear and nonnuclear facility emergency preparedness and occupational safety; and continued support for the DOE Laboratory Accreditation Program (DOELAP) and applied health physics research and development.

II. A. Summary Table

Activity	FY 1989	FY 1990	FY 1991	% Change
Salaries, Benefits and Travel	$10,900	$17,500	$19,400	11
Other Contractual Support	500	1,824	2,358	29
Total	$11,400	$19,324	$21,758	13

III. Activity Description

FY 1989	FY 1990	FY 1991
Salaries, Benefits and Travel		
Funds to cover salaries and benefits for 204 FTEs, and associated travel expenses for the Environmental Survey and Audit Programs, safety surveys and appraisal follow-up, special reviews, onsite technical assistance. ($10,900)	Funds to cover support staff level of 269 FTEs and increased travel associated with the significantly strengthened program. ($17,500)	Fund staff of 269 FTEs and associated travel. ($19,400)
Other Contractual Support		
Contractual support for ADP, MIS, including Office Automation work station maintenance and support, and budget, personnel and administrative services for ES&H staff. ($500)	Contractual support for ADP, MIS, including Office Automation work station maintenance and support, and budget, personnel and administrative services for increased ES&H staff. ($1,824)	Continued contractual support. ($2,358)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

Environment, Safety and Health

I. Preface: Capital Equipment

Capital Equipment is required for the following programs conducted by Environment, Safety and Health on behalf of the DOE as a whole. These programs are: the DOE Laboratory Accreditation Program (DOELAP), Health Physics Research and Development, the Integrated Environmental Information Data Base, and purchases of personal computer workstations and software for additional staff.

The DOE Laboratory Accreditation Program is a relatively new activity. As such, equipment is being purchased over the next three years at a pace commensurate with the number of DOE and DOE contractor laboratories that will be accredited. The Health Physics Research and Development program will continue improving worker monitoring and assessment of radiation dose. Equipment purchases will be needed for improving detection sensitivity, improved organ dose determinations, improving measurement for internally deposited radionuclieds, and improving instruments for evaluation of beta doses.

Funds are also required to support performance measurement and analysis of safety data, and to support environmental residuals projection models and other environmental analysis projects. Capital equipment is also required for test and calibration equipment in support of the Fire Protection Program, the Industrial Hygiene Task Force, the toxic material Advisory Program, and replacement and upgraded respiratory protective equipment.

II. A. Summary Table

Activity	FY 1989	FY 1990	FY 1991	% Change
DOE National Response Capability	$2,000	$2,070	--	-100
Radiation Protection	500	530	500	-6
Office Automation	600	457	1,042	128
Total	$3,100	$3,057	$1,542	-50

II. B. Major Laboratory and Facility Funding

Idaho National Laboratory	$1,550	$1,600	$600	-63
Pacific Northwest Laboratory	382	400	400	0
Lawrence Livermore National Laboratory	450	500	--	-100

III. Activity Description

FY 1989	FY 1990	FY 1991
DOE National Emergency Response Capability		
Atmospheric Release Advisory Capability (ARAC)		
The ARAC was maintained with equipment dollars devoted to the meteorological data system and the initiation of a 3-year program to replace systems for which replacement parts are no longer available. The ARAC was improved with the acquisition of a laser graphics capability and upgrades of computer capability for displaying and storing data. ($450)	Continue to maintain ARAC by replacing system for which replacement parts are no longer available. Improve the reliability and utility of the ARAC with acquisition of an optical disk system, mini-supercomputer, and installation of an uninterruptible power system. Transfer function to Defense Programs. ($500)	No Activity. ($0)
Aerial Measurement System		
Purchased and installed radiological survey equipment to measure radioactivity dispersal and contamination in pre-and post-accident situations. Photo and video survey equipment was purchased to permit rapid transmittal of data to cognizant Federal agencies in Washington, D.C., in the event of a major	Radiological survey systems will require more than normal maintenance, including replacement of parts, particularly related to data acquisition and processing. Transfer function to Defense Programs. ($1,570)	No Activity. ($0)

FY 1989	FY 1990	FY 1991
accident. Aircraft flight crew equipment use certification was maintained. ($1,550)		
Radiation Protection		
DOE Laboratory Accreditation Program (DOELAP)		
DOELAP is a relatively new program. As such, equipment and a facility are being purchased over the next 3 years at a pace commensurate with the number of DOE and DOE contractor laboratories that will be accredited. During FY 1989, specific items acquired to fulfill this mission were: neutron spectrometer system, microwave exposure system, tissue equivalent proportional counter, beta spectrometer system, and fission product calibration phantom. ($280)	A neutron irradiation facility is required to verify the accuracy of DOE and DOE contractor dosimetry programs. Construction will begin in FY 1990 and be completed in FY 1991. Included in this effort is a need to upgrade the radioactive source transfer system and computer controls. ($360)	Continue construction of neutron irradiation facility to be completed in FY 1992 ($380)
Health Physics Support and Assistance		
Equipment was acquired for DOE site radiation protection assistance and appraisals. This included instrumentation and electronics to test nuclear detection instruments. ($70)	No capital expenditures are planned. ($0)	Prototype survey instruments are needed for field appraisals. ($120)

FY 1989	FY 1990	FY 1991
Health Physics Applied Research and Development		
Acquired equipment necessary to continue last staged of R&D projects initiated in previous years. R&D program refocused in FY 1989 to address only DOE field operational problems. ($150)	Refocused program will require air sampling and monitoring equipment, calibration sources and related apparatus, and a human phantom with internal organs. ($170)	No activity. ($0)
Office Automation		
Purchase equipment for additional staff. Upgrade obsolete equipment. Continue maintenance support. ($600)	Purchase equipment for staff. Provide equipment for Integrated Environmental Information Data Base. Upgrade obsolete equipment. Continue maintenance support. ($457)	Purchase equipment for staff. Upgrade obsolete equipment. Provide equipment for Integrated Environmental Information Data Base. Continue maintenance support. ($1,042)

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(obligations dollars in thousands)

OBJECT CLASS SUMMARY

Environment, Safety and Health

Direct Funding:		FY 1989	FY 1990	FY 1991
11.1	Full-time permanent	$9,902	$13,299	$13,792
11.3	Other than full-time	198	201	208
11.5	Other Compensation	200	350	500
11.9	Total Personnel compensation	$10,300	$13,850	$14,500
12.1	Benefits	1,400	2,000	2,700
21.0	Travel	1,510	2,000	2,700
25.0	Other Services	74,690	88,095	75,979
31.0	Equipment	3,100	3,057	1,542
99.0	Subtotal	$80,700	$95,152	$82,921
	Totals	$91,000	$109,002	$97,421

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VOLUME 2

LIQUEFIED GASEOUS FUELS SPILL TEST FACILITY

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

OVERVIEW

LIQUEFIED GASEOUS FUELS SPILL TEST FACILITY

In the last decade several large research and development programs addressing concerns associated with liquefied fuels (LGF's) and many smaller related efforts have been conducted by industry and government organizations in the U.S., Europe, Japan and other countries. In 1977, the Department of Energy (DOE) assumed lead agency responsibility for government-sponsored research on the safety and environmental control of liquefied natural gas (LNG). As this program developed, its scope was enlarged to address safety issues of other materials with potential hazards similar to those of LNG, including liquefied petroleum gas (LPG), ammonia (NH_3), and hydrogen (H_2). This effort was known as the DOE Liquefied Gaseous Fuels (LGF) Safety Research Program, and was the culmination of the Government's effort to protect public health and safety as well as the environment from the potentially hazardous effects of these materials.

Additional research and testing is required to determine the effects of LGF spills of larger quantities and higher spill rates, and to obtain data on other hazardous materials. A Congressional initiative to provide a permanent Spill Test Facility to conduct this research was approved in September 1982 and funds were included in the FY 1984 Appropriation Bill. The Nevada Test Site was designated for construction of the Liquefied Gaseous Fuels Spill Test Facility to be located at the Frenchman Flat area because it provides a uniquely favorable environment in which to perform large-scale atmospheric dispersion tests.

Construction was completed and the facility became operational during FY 1986. It can now provide the test bed for the development of safety and environmental control information needed by government regulatory agencies, industry, and the general public to assure the protection of the public health and safety as well as the environment from the potentially hazardous effects of accidental releases of liquefied gaseous fuels and other hazardous and toxic liquids. The Spill Test Facility provides for the conduct of spill tests at large volumes and safety research on a broader range of hazardous materials.

The Liquefied Gaseous Fuels Spill Test Facility (LGFSTF) program has significantly increased the available knowledge of hazard phenomena associated with dense gaseous liquids through the successful execution of small, medium and large scale releases of LNG, hydrogen fluoride and other hazardous dense gaseous liquids. These tests have led to the development of necessary models, established a basis of background technical information and have provided the information required to conduct release prevention and control assessments. This knowledge has

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practical application as a basis for regulatory decisions, industry actions and private information relating to LGF and other dense gaseous liquids safety issues. The industrial community has become more aware of the facility because of these tests and is considering similar releases with other toxic and/or hazardous chemicals of public concern.

During FY 1987, Congress, through Section 118(n) of Public Law 99-499 (Superfund Amendments and Reauthorization Act of 1986), headed "Spill Control Technology", directed the Secretary of Energy (1) to establish a test program at the LGFSTF to evaluate technologies responsive to spill releases of hazardous materials; (2) to conduct a technology transfer program; and (3) to arrange for the use of the LGFSTF in carrying out the provisions of the subsection. In the House Energy and Water Development Report which accompanied the FY 1987 Continuing Appropriations Act, the Committee directed the DOE to develop a Memorandum of Understanding (MOU) with the Department of Transportation (DOT) and the Environmental Protection Agency (EPA) to establish a long-range plan for collaborative research at the LGFSTF.

The work to be performed under the MOU allows the DOE/EPA/DOT in coordination with the private sector, states and other agencies to develop, structure and prioritize the establishment of a generic, national research and development (R&D) program germane to heavier than air gas dispersion, hazardous substance releases and related mitigating technologies. This collaborative R&D approach will allow industry and government to cooperate in a broad range of R&D activities that may serve both industry interests and provide a broad technology base in support of national and state LGF-related environmental concerns. Further, this venue will assure that federal funds are utilized to optimum advantage and applied to those research efforts that are most responsive to the environmental well-being of the nation.

The overall goals of the Liquefied Gaseous Fuels Spill Test Facility Program are to:

- o design, construct, and make available on a user-fee basis a facility suitable for conducting spill tests of liquefied gaseous fuels and other toxic liquids, and
- o promote the development by users of liquefied gaseous fuels and other toxic and hazardous liquids, of an experimentally-verified technical data base that will aid in the prevention, mitigation, cleanup, and prediction of environmental effects of spills of these materials.
- o structure, formulate and manage a collaborative long-range research and development program to evaluate technologies responsive to accidental releases of hazardous materials.
- o conduct a technology transfer program germane to LGF-related activities.

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The specific objectives of these goals through use of the test facility are to:

- o develop and validate the release behavior of LGF and other toxic hazardous chemicals in sufficient depth to provide a firm technical foundation for development of industry standards and promulgation of regulations.
- o investigate, develop, and validate methods for preventing accidental LGF and other toxic or hazardous chemicals spills.
- o investigate, develop, and validate methods for controlling the consequences of accidental LGF and other toxic or hazardous chemical releases.
- o establish an MOU among DOE/EPA/DOT to provide the basis for the establishment of the long-range collaborative research plan.

Operation of the Test Facility by the Federal Government on a cost recovery basis for users is key under these goals.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

LEAD TABLE

Liquefied Gaseous Fuels Spill Test Facility

Activity	FY 1989	FY 1990[a/]	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
Liquefied gaseous fuels spill test facility (ESRD)						
Operating expenses	$1,500	$1,025	$1,025	$1,085	$+60	+6
Subtotal	1,500	1,025	1,025	1,085	+60	+6
Total						
Operating expenses	1,500	1,025	1,025	1,085	+60	+6
Liquefied gaseous fuels spill test facility	$1,500	$1,025	$1,025	$1,085	$+60	+6
Staffing Total FTE's: Direct	0	0	0	0		
Indirect	2	2	2	2		

a/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and P. L. 101-164 reductions to fund anti-drug activities.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Liquefied Gaseous Fuels Spill Test Facility

FY 1990 Appropriation	$1,025
LGFSTF	
o Continue to provide for program continuity, stability; Headquarters and field management and administration	+60
FY 1991 Congressional Budget Request	$1,085

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

LIQUEFIED GASEOUS FUELS (LGF) SPILL TEST FACILITY

I. Preface: LGF Spill Test Facility

The overall goal of the Liquefied Gaseous Fuels Spill Test Facility is to design, construct, and continue to make available on a user-fee basis a facility suitable for conducting spill tests of liquefied gaseous fuels and other hazardous and toxic gaseous liquids. Though originally designed to accommodate large volume spills, the facility can now accommodate safety related testing of most chemicals in commercial use in much smaller volumes, thereby increasing its utility to the public and private sector. The Liquified Gaseous Fuels Spill Test Facility program continues to promote the development of an experimentally-verified technical data base that will aid in the prevention, mitigation, clean-up and prediction of the environmental effects from spills of toxic and hazardous gaseous liquids. Further understanding of the effects of accidental and sudden releases of these materials into the environment will aid in the broader understanding of potential impediments of advanced gaseous and fluid energy sources in the future U.S. energy economy. The facility continues to provide a test bed for the development of safety and environmental control information needed by government regulatory agencies, industry, and the general public to assure protection of worker and public health and safety and the environment from the potential hazardous effects of sudden and accidental releases of toxic and hazardous gaseous liquids. Since the facility became operational in 1986, the public and private sector have utilized the facility in each of the ensuing years. Results of these tests have provided additional information to the growing technical data base in this area. Future use of the facility by the private sector is expected to increase as a result of enforcement of laws enacted, such as the Superfund Amendments and Reauthorization Act of 1986, Title 3, and others that may be enacted in the future which may have an added effect on the U.S. energy economy.

Congressional mandate (PL 97-377) categorized the LGFSTF as a "National Resource". Since this was the case, the Department of Energy (DOE) requested the DOE Controller for an all-inclusive waiver of those portions of the DOE pricing policy (DOE Order 2110.1, dated 2/16/84, revised 7/14/88 and 10/05/88) which require non-federal entities be charged a factor for depreciation and an overall "added factor" as components of "full cost" in instances where reimbursable services are provided to such entities in connection with the LGFSTF. This waiver was granted in April 1985. It was anticipated that test sponsors would include federal agencies, non-profit organizations, various consortia of commercial/industrial firms and individual commercial entities. The "sale" of the use of the LGFSTF differs from most other sales of goods or services by DOE in that the use of the facility is the only end product and programmatic objective, rather than being a side-line or non-interference off-shoot of a DOE program. The purpose of the facility is to provide information which will enable the enhancement of safe procedures for handling various toxic and hazardous gaseous liquids, and provide knowledge on consequences of accidental spills of the materials. To date there has been four user fee reimbursable contracts with the Department approximating $5.7 million. Anticipated user fee reimbursable contracts in the FY 1989-FY 1990 period are expected to approximate $1.0 million for test sponsors such as the Department of Labor, Occupational Safety and Health Administration, Ansul Corporation, the Silicone Health Council, and the Dow Chemical Company. It is anticipated that this level of user fee reimbursable contracts will continue in FY 1990-FY 1991. In addition, the Department has been provided funds for collaborative R&D utilizing the facility. The Department is signatory to an agreement with the Environmental Protection Agency and the Department of Transportation for planning and collaborative R&D and anticipates stimulation of increasing cost-shared research.

II. A. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Liquefied Gaseous Fuels Spill Test Facility	$1,500	$1,025	$1,085	+6
II. B. Major Laboratory and Facility Funding				
Lawrence Livermore National Laboratory	$100	$0	$0	0

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III. Activity Description:

Program Activity	FY 1989	FY 1990	FY 1991
Liquefied Gaseous Fuels Spill Test Facility	Continued to provide for program continuity, stability, and Headquarters and field management and administration which will allow for the flexibility required to supply the necessary responsiveness to prospective facility users in areas of cost estimates, ES&H issues and approvals, pre-test documentation, scientific support. ($201) (WRI,LLL)	Continue to provide for program continuity, stability, and Headquarters and field management and administration which will allow for the flexibility required to supply the necessary responsiveness to prospective facility users in areas of cost estimates, ES&H issues and approvals, and pre-test documentation. ($138) (TBD)	Continue to provide for program continuity, stability, and Headquarters and field management and administration which will allow for the flexibility required to supply the necessary responsiveness to prospective facility users in areas of cost estimates, ES&H issues and approvals, and pre-test documentation. ($170) (HG & WV)
	Supported management and maintenance of the spill facility in support of potential users and the mandated collaborative DOE/EPA/DOT long-range R&D program. Continue facility baseline operations support and technical interaction with potential sponsors of research. ($717) (EG&G)	Continue to provide for the management and maintenance of the spill facility in support of potential users and the mandated collaborative DOE/EPA/DOT long-range R&D program. Continue facility baseline operations support and technical interaction with potential sponsors of research. Total of $793 which includes $300 of prior year funds. ($493) (EG&G)	Continue to provide for the management and maintenance of the spill facility in support of potential users and the mandated collaborative DOE/EPA/DOT long-range R&D program. Continue facility baseline operations support and technical interaction with potential sponsors of research. ($515) (EG&G)
	Continued support of collaborative DOE/EPA/DOT long-range R&D program. ($582)	Continue support of collaborative DOE/EPA/DOT long-range R&D program. ($394)	Continue support of collaborative DOE/EPA/DOT long-range R&D program. ($400) (TBD)
	1,500	1,025	1,085

VOLUME 2

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

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OVERVIEW

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

HEALTH, ENVIRONMENT AND ENERGY TECHNOLOGY

The Biological and Environmental Research (BER) program develops the knowledge needed to identify, understand, and anticipate the long-term health and environmental consequences of energy use and development. Another objective of the program is to use the Department's unique scientific and technological capabilities to solve major scientific problems in medicine and biology.

The Department's Health and Environmental Research responsibility began with the formation of the AEC in 1946. Research into the potential health impacts of radiation accompanied the initial mandate to develop nuclear energy and nuclear weapons technology. Studies centered on health effects in the Japanese atomic bomb survivors and dose-response studies in experimental animals and specifically addressed long term, late effects such as cancer. Positive correlations between radiation exposure and cancer were shown, both in the Japanese population and in experimental animals, which provided a quantitative scientific framework for policy decisions regarding establishment of radiation protection standards.

As definitive information was obtained concerning relatively high levels of radiation exposure, attention was turned to potential effects at lower doses that might be received by worker populations or the general public. This concern dictated additional epidemiology studies on selected populations, such as contractor employees, and a more comprehensive research program involving experimental animal, cellular, and molecular studies. The epidemiologic studies showed some excess mortality from multiple myeloma in an early radiation worker population that received relatively large exposures compared with today's worker population. However, the laboratory research demonstrated that biological repair and recovery processes operate at low levels of X-ray or gamma exposure, thus providing assurance that radiation protection standards based on linear extrapolation of high dose findings are indeed conservative. Early research on exposure measurement technology provided the personnel and area monitoring capability now employed at national laboratory and commercial nuclear power facilities. Current research will achieve not only more sensitive radiation exposure measurement techniques but also advanced techniques to measure chemical exposures from nuclear and non-nuclear energy operations.

The extensive human exposure data base within the Departmental contractor worker population has, as previously stated, been used by DOE scientists to study health effects. These studies have been and continue to be published in the scientific literature. However, outside groups have also expressed interest

in access to this information and we are responding to this interest. An expanded effort to develop a Comprehensive Epidemiologic Data Resource (CEDR) is included in this budget request. With guidance from the National Academy of Sciences, a central facility containing validated data on worker exposure will be maintained. Care will be taken to assure individual privacy. This effort will be coordinated at the international level. Through active participation, with the International Agency for Research on Cancer, we will strive to achieve a coordinated research effort to assure intercomparability of research findings and valid combining of exposure data. Under the protocol signed May 26, 1989, following the Eighth Meeting of the US-USSR Joint Committee on Cooperation in the Peaceful Uses of Atomic Energy, the Joint Committee agreed to full and complete sharing of information on environmental and health effects of radiation. At a follow-on joint US-USSR task group meeting this coming September, we shall work to include Soviet epidemiologic studies on the exposed Chernobyl population into the international research effort.

The DOE program continues to be the lead Federal program in Radiobiology, constituting about two-thirds of the national effort. The program is primarily oriented towards research at the relatively low doses received by worker populations. Most of the rest of U.S. radiobiological research is supported by the National Cancer Institute and is oriented towards high-dose radiation therapy of tumors and evaluating the late effects of such doses to the surviving patient. Radiobiological research in this country is coordinated through the OSTP's Committee on Interagency Radiation Research and Policy Coordination. The DOE effort is also coordinated with European radiation research programs through a Memorandum of Understanding with the Commission of European Communities; with Japan through the Binational Agreement; and with the USSR through the Joint Coordinating Committee for Civilian Nuclear Reactor Safety which includes formal cooperation on research and data exchange on the health and environmental effects of the Chernobyl reactor accident.

The late effects of chronic low level radiation exposure will be difficult if not impossible to confirm in epidemiologic studies, yet improved insight is needed to understand such concerns as indoor radon and general population exposure to contaminants that may result from Departmental activities. There is a particular need for a firm scientific basis to guide decisions regarding any changes in the occupational exposure standards to neutrons.

The DOE human genome program represents a new approach, based on modern biology and technology, to the more than forty year old mission of evaluating effects of low doses of exposure to energy related agents. The Department is exploiting the multidisciplinary capabilities of its national laboratories to develop the biological resources and the technologies needed to characterize at the molecular level the entire human genome in the next fifteen years. Results of this work will provide the basis for more definitive risk estimates, and the assessment of individual sensitivities at low levels of exposure to physical and chemical agents. It will open completely new levels of understanding of radiation and chemical action at the most fundamental level of life, the DNA molecule, and will significantly impact the biomedical and biotechnolo communities. While the DOE program, which is planned and carried out in coordination with the National Institutes of Health (NIH), is focused towards developing capabilities and tools, the NIH effort is oriented towards characterizing disease-oriented genes, by exploiting both human and non-human model systems.

Structural biology brings the tools of modern science (recombinant DNA technology, site-directed mutagenesis, rapid structure determination with sophisticated equipment, theoretical advances, powerful computers and graphics) together to permit major advances in our understanding of the relationship between macromolecular structure and biological function. Such increased understanding and the concomitant ability to manipulate structure and biological function has enormous implications for the Department's ability to cost-effectively carry out its energy, environmental and technology transfer missions. This knowledge base will provide the intellectual foundation for the enormous gamut of applications of biotechnology and molecular sciences. As pointed out by several DOE and National Academy committees, DOE has a special opportunity and responsibility (because of the capital-intensive user facilities located and under development at its laboratories, and computational and other resources located there) to play a major role in the advance of this knowledge base. DOE's structural biology program is focused on providing the resources which are necessary for efficient utilization of current and developing facilities.

The environmental research program, in a similar manner, evolved from an initial need to understand the pathways of radioactive materials from weapons testing through atmospheric, marine and terrestrial media, to human exposure. This research has produced quantitative models describing atmospheric, oceanographic and terrestrial movement of materials which were employed to describe and predict the distribution, uptake and human exposure from the Chernobyl nuclear reactor accident.

The research base established within the DOE environmental research program has enabled the Department to respond effectively to recent national concerns. The DOE research in atmospheric chemistry has been a key component of the National Acid Precipitation Assessment Program (NAPAP). The National Laboratories have mounted a series of major field studies of the processing of sulfur and nitrogen oxides by clouds and precipitation and the mechanisms of their deposition on sensitive ecosystems. The work will contribute to a more informed approach to contemplated emission control strategies addressing the acid rain problem. The DOE research in atmospheric transport and diffusion has greatly enhanced the emergency preparedness and emergency response systems at the sensitive DOE facilities. Other environmental research programs cover the marine and terrestrial ecosystems. These programs are directed at regional or large scale systems addressing water and land use that include the exchange of materials from marine ocean margins with the deep open ocean system such as fate of carbon production from the shelf, as well as human derived contaminants. The terrestrial ecosystem program has established a Federal lead in landscape research and modeling and from research in the past provided definitive information on the buffering capacity of soils to acid rain and carbon cycling in forested ecosystems.

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A more recent environmental concern has been possible global warming from the increase of greenhouse gases and especially carbon dioxide (CO_2) in the atmosphere from the burning of fossil fuels. For over ten years the Carbon Dioxide Research Program has studied the carbon dioxide interactions with the atmosphere, the biosphere, the oceans and the cryosphere and the resultant impacts on critical resources. The Carbon Dioxide Research Program is the principal DOE activity in the U.S. Global Change Research Program organized by the Committee on Earth Sciences of the Office of Science and Technology Policy (OSTP). The Secretary of Energy has identified global warming as an important environmental consideration in the development of the National Energy Strategy. Consequently, DOE has launched a major research initiative to accelerate progress in the scientific capability to predict global and regional climate change. A principal component of this initiative is an experimental program to accurately quantify the cloud-climate feedback system and to improve the corresponding parameterizations in the climate change prediction models. A second component is an effective integration of advanced computer hardware and software with the next generation climate models in order to accelerate computing throughputs by a factor of 10,000 within the next ten years.

The terrestrial transport program is DOE's only basic long term research directly related to subsurface contamination and ground water. It evolved in the 1980's from research that addressed primarily surface deposition of radionuclides into one directed at mixed wastes. It provides the underpinning for environmentally safe and cost effective restoration and remediation. In FY 1991 research will be directed at characterization, assessment, and environmental restoration, including: improved environmental measurement technology; physical, chemical, and biological interactions that control the transport of mixed contaminants; and chemical and microbial techniques for waste remediation. The program is completing a research program plan for long-term research in environmental restoration for the Office of Energy Research. Close coordination is maintained with the near-term five year planning effort for environmental restoration and waste management to assure effective coupling of our longer term research with the more immediate five year task force that has been mobilized within the Department.

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MEDICAL APPLICATIONS

Under its mandate, originally expressed in the Atomic Energy Act of 1946, to promote the utilization of radioactive materials for medical and other purposes, the Atomic Energy Commission (AEC) undertook a vigorous program of producing and distributing radionuclides for medical applications. As progressively sophisticated applications in diagnosis and therapy developed, this led to the establishment of nuclear medicine as a recognized medical specialty, and radionuclide production as a flourishing industry. A major advantage of nuclear medicine procedures has been that dynamic functional information about various organs of the body can be obtained with non-invasive procedures. The concurrent development of instrumentation, particularly first the gamma camera and later single photon emission computed tomography (SPECT) and positron emission tomography (PET), which are imaging devices, greatly improved the physician's ability to detect small lesions and to quantify functional processes in the body.

Under the successors of the AEC, the Energy Research and Development Administration (ERDA) and the Department of Energy (DOE), the programs of medical applications have been continued and expanded. The current program includes six major research areas: (1) research with stable isotopes, (2) research to develop new radioisotopes, (3) development and application of new radiopharmaceuticals, (4) instrumentation, (5) clinical feasibility and (6) boron neutron capture therapy (BNCT).

The isotope and radiopharmaceutical research programs are largely directed to improving methods for studying the functions and improving diagnosis of diseases of the brain and heart. The instrumentation program contributes to these efforts by improving the resolution and other qualities of the imaging process. The clinical feasibility program includes the use of synchrotron radiation for a safer method of angiography, the use of particle beams for therapy of vascular malformations and cancer, and the use of improved radiopharmaceuticals for studying brain function.

The DOE program in medical applications differs from related programs of the National Institutes of Health (NIH) in that the latter are more strongly clinical and are disease-oriented, whereas the DOE program is oriented toward research and development of new technologies. Innovative procedures developed under the DOE programs become the province of the NIH when extensive clinical studies of feasibility are to be conducted.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(Dollars in Thousands)

LEAD TABLE

Biological and Environmental Research

Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Base	FY 1991 Request	Program Change Request vs Base	
					Dollar	Percent
Biological and Environmental Research	$214,303 a/b/	$270,736	$270,736	$317,888	$+47,152	+ 17%
Program Direction	4,000	4,536	5,800	5,800	0	--
Capital Equipment	8,965	11,272	11,272	11,621	+ 349	+ 3%
Construction	23,500	22,149	22,149	3,485	- 18,664	- 84%
Total	$250,768 a/b/c/	$308,693 c/d/	$309,957 c/	$338,794 c/	$+28,837	+ 9%
Operating Expenses	($218,303)	($275,272)	($276,536)	($323,688)	$+47,152	+ 17%
Capital Equipment	(8,965)	(11,272)	(11,272)	(11,621)	+ 349	+ 3%
Construction	(23,500)	(22,149)	(22,149)	(3,485)	- 18,664	- 84%
Staffing Total FTE's						
Headquarters	54	65	65	65	--	--
Field	89	87	87	87	--	--
Total	143	152	152	152	--	--

Authorization: Section 103, P.L. 93-438, Section 203, P.L. 95-91.

a/ Total has been reduced by $2,650,000 which has been transferred to SBIR.
b/ Reflects comparability adjustment of $890,000 for transfer of isotopes to Nuclear Energy.
c/ Reflects comparability adjustment for new Environmental Restoration and Waste Management program as follows: FY 1989 - $4,084,000; FY 1990 - $5,294,000; FY 1991 - $3,401,000.
d/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Biological and Environmental Research

FY 1990 Appropriation	$ 308,693
Adjustments - Increased personnel costs	+ 1,264
FY 1991 Base	309,957
- Continue radiation and chemical dosimetry, sustain measurement technology and instrumentation	+ 1,851
- Increase field and laboratory studies on transport and transformation of chemicals through atmospheric, terrestrial and marine systems	+ 4,160
- Maintain epidemiologic, biological markers studies, and long-term experimental animal research on radiation and complex chemical mixtures	+ 1,661
- Continue research in structural biology, molecular genetics, cell biology	+ 4,001
- Maintain efforts on medical applications feasibility studies and related instrumentation	- 292
- Expand carbon dioxide research program to develop atmospheric measurement systems for first detection of the global warming signal and to quantify linkages between the rise of greenhouse gases and climate change	+15,854

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- Continue to enhance efforts on mapping the entire human genome	+19,917
- Maintain base capital equipment and general plant projects program needs	+ 1,405
- No provision for funding of Congressionally initiated university construction projects in FY 1991	-19,720
FY 1991 Congressional Budget Request	$338,794

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

I. Preface: Analytical Technology

Population exposure underlies both the development of risk coefficients and an assessment of projected health impacts. This exposure may be estimated by characterization of the radiation or chemical source combined with the application of suitable mathematical models which compute the exposure of the receptor population. Alternatively, exposure may be determined by direct measurement using appropriate personnel or area monitoring instrumentation. The analytical technology program develops and evaluates the instrumentation and computational technology required to address this responsibility for safe operation of Departmental facilities.

II. A. Summary Table: Analytical Technology

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Dosimetry Research	$ 9,305	$ 9,252	$ 10,360	+ 12
Measurement Science	4,927	5,907	6,650	+ 13
Total, Analytical Technology	$ 14,232	$ 15,159	$ 17,010	+ 12

II. B. Major Laboratory and Facility Funding

Ames Laboratory	$ 514	$ 401	$ 438	+ 9
Argonne National Laboratory	$ 707	$ 687	$ 653	- 5
Brookhaven National Laboratory	$ 86	$ 102	$ 110	+ 8
Environmental Measurements Laboratory	$ 4,315	$ 4,496	$ 4,790	+ 7
Idaho National Engineering Laboratory - EG&G	$ 85	$ 105	$ 113	+ 8
Inhalation Toxicology Research Institute	$ 170	$ 166	$ 181	+ 9
Lawrence Berkeley National Laboratory	$ 1,651	$ 1,650	$ 1,722	+ 4
Lawrence Livermore National Laboratory	$ 839	$ 627	$ 491	- 22
Los Alamos National Scientific Laboratory	$ 125	$ 0	$ 0	0
Oak Ridge National Laboratory	$ 2,501	$ 2,363	$ 2,689	+ 14
Pacific Northwest Laboratory	$ 1,385	$ 1,263	$ 1,340	+ 6

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Analytical Technology			
Dosimetry Research	Maintained radiological characterization and Chernobyl data base activities.	Complete compilation of a comprehensive Chernobyl data base. Maintain characterization studies of radiation sources and defining pathways from source to humans.	Maintain, update and distribute a comprehensive Chernobyl data base. Maintain characterization studies of radiation sources and defining pathways from source to humans.
	Maintained radiation and chemical dosimetry research with emphasis on mixed field radiation dosimetry techniques and methodology for DNA adduct measurement. Continued extension of advanced external dosimetry computational techniques to occupational health applications. Sustained radon research for development of better dosimetric concepts; improved exposure-dose relationships; enhanced definition of radon availability, distribution and migration in the indoor environment; and a more refined understanding of high LET interactions with biomolecules. ($9,305)	Maintain radiation dosimetry research with particular emphasis on radon and radon daughters, and on fundamental studies of the microdosimetry of high LET radiation. Continue research on characterizing DNA damage resulting from energy-related chemical toxicants. ($9,252)	Research will continue on fundamental studies of the microdosimetry of high LET radiation. Dosimetry research on radon and radon daughters will be continued. DNA adduct characterization and measurement program will continue with emphasis on measuring chemical exposures. ($10,360)
	$ 9,305	$ 9,252	$ 10,360
Measurement Science	Sustained measurement technology and instrumentation development research. Continued development of advanced laser techniques for sensitive and selective chemical measurements. Maintained a focus on biologically active materials and detection of damage to biological systems. Completed development of instrumentation to measure primary biomass production in the oceans. ($4,927)	Maintain development of advanced instrumentation and new measurement technology concepts. Emphasis on laser based techniques for ultrasensitive detection of biological damage will continue. Development of new techniques to chemically separate toxic compounds will be completed. ($5,907)	Maintain research program on advanced instrumentation and measurement concepts. Primary emphasis will be on multiphoton ionization processes for ultrasensitive detection of biological damage. Specific laser spectroscopic techniques will be developed to measure DNA adducts at very low concentration levels. ($6,650)

III. Analytical Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Measurement Science (Cont'd)	$ 4,927	$ 5,907	$ 6,650
Analytical Technology	$ 14,232	$ 15,159	$ 17,010

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

I. Preface: Environmental Research

Discharges and disturbance from energy sources can be localized or distributed regionally and worldwide. This program addresses the transport of discharges and their behavior through the atmosphere, marine and terrestrial ecosystems at different spatial scales, and over different time sequences. This information is essential to determine exposure and influence of these materials and their byproducts on the environment and the resiliency of biological systems to disturbance. The broadness of this charge requires focusing on a few selected but important areas of research that provide the information for developing unifying concepts that can be translated into solving current and future energy/environmental concerns.

The atmospheric program has two distinct components. The first is in the area of atmospheric chemistry and addresses the processing of pollutants by clouds, precipitation, and air-surface exchange as well as the role of organics. The second explores transport and diffusion over complex terrain with a goal of providing research results which could be used by the Department to enhance the emergency preparedness and response systems at key DOE installations.

The marine program concentrates on the exchange of energy and natural materials between the continental shelf and the open ocean. Close collaboration with other Federal agencies working in the open ocean and space makes this program pivotal in understanding dynamics of the ocean margins and their influence on both land and open ocean systems, particularly from the viewpoint of energy discharges and their assimilation into the ocean.

The terrestrial transport program concentrates on the transport of materials through the subsurface soils and ground water systems and on exploring microbial communities in deep sediments for remediation potential. The program concentrates on mid- to long-term needs of DOE waste related problems and is being closely coordinated with the near-term applied research in other parts of DOE.

Ecosystem functioning and response is designed to develop the fundamental theoretical basis needed to understand complex ecological systems and to apply these to experimental DOE field sites designated as National Environmental Research Parks and in Arctic Alaska for optimum management of environmental problems at DOE weapons and energy sites and for understanding global and regional systems.

II. A. Summary Table: Environmental Research

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Atmospheric Science	$ 11,448	$ 12,281	$ 13,292	+ 8
Marine Transport	5,779	6,040	6,901	+ 14
Terrestrial Transport	10,492	14,356	15,688	+ 9
Ecosystem Functioning and Response	8,573	7,844	8,800	+ 12
Total, Environmental Research	$ 36,292	$ 40,521	$ 44,681	+ 10

II. B. Major Laboratory and Facility Funding

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Argonne National Laboratory	$ 1,501	$ 1,532	$ 1,525	0
Brookhaven National Laboratory	$ 4,556	$ 4,072	$ 4,260	+ 5
Environmental Measurements Laboratory	$ 2,190	$ 2,208	$ 2,059	- 7
Fermi National Accelerator Laboratory	$ 50	$ 49	$ 50	+ 2
Idaho National Engineering Laboratory - EG&G	$ 145	$ 368	$ 330	- 10
Lawrence Berkeley National Laboratory	$ 833	$ 1,041	$ 863	- 17
Lawrence Livermore National Laboratory	$ 1,603	$ 1,710	$ 1,694	- 1
Los Alamos National Scientific Laboratory	$ 1,466	$ 1,280	$ 1,235	- 4
Oak Ridge Associated Universities	$ 84	$ 0	$ 0	0
Oak Ridge National Laboratory	$ 3,033	$ 3,282	$ 3,589	+ 10
Pacific Northwest Laboratory	$ 6,365	$ 8,197	$ 9,064	+ 11
Savannah River Ecology Laboratory	$ 409	$ 295	$ 350	+ 19
Savannah River Laboratory	$ 442	$ 408	$ 515	+ 26

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Environmental Research			
Atmospheric Science	The final field study of cloud and precipitation processing of pollutants took place with emphasis on frontal and primarily nonconvective large scale systems. This experimental effort was also coordinated with the EPA sponsored field measurements for the verification of the acid deposition models. Development of the wet scavenging module for the acid deposition models was completed and delivered to the modeling task group. Laboratory simulations of the dominant chemical mechanisms continued for further improvement of the chemical kinetics parameterizations. The task of synthesis of the major PRECP accomplishments coupled with a concise deposition climatology commenced. The upgraded MAP3S research network continued operations. Analytical studies exploring source/receptor	Research activities for the National Acid Precipitation Program will concentrate primarily on the preparation of key parts of the 1990 state-of-the-science reports on precipitation scavenging, cloud chemistry processes and dry deposition. Data from the seven PRECP experiments and the dry deposition investigations will be evaluated for their relevance to the integrated assessment needs and will be used for model verifications and for improvement of parameterizations of atmospheric processes in these models. Limited field and laboratory investigations will be undertaken for quality assurance purposes and for incidental model verification needs. The experimental upgrade of the MAP3S precipitation chemistry network will commence. A pilot study of climatic	A major field study will be launched over the northeastern United States and the western North Alantic to determine the fate of man-made emissions of sulfur and nitrogen oxides. Emphasis will be placed on the aqueous phase transformations of these products into longer-lived aerosols which may have the potential to modify cloudiness and thus alter climate processes. Attention will be focused initially on sulfate aerosols and cyclonic storms which may promote super-regional transport (>1000km). The contribution of naturally occurring sulfate aerosols from oceanic dimethylsulfide will be explored. Activities will be coordinated with the Interagency Global Tropospheric Chemistry Experiment. Limited numerical modeling of the governing atmospheric chemistry processes will be pursued as well as

III. Environmental Research (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Atmospheric Science (Cont'd)	relationships with the use of the MAP3S data was initiated. Dry deposition research activity remained level. ($5,429)	effects of aerosols on a super-regional scale will be initiated. ($4,040)	benchmark laboratory studies of aqueous chemical reactions. The MAP3S Precipitation Chemistry Network will continue monitoring and will expand to include parameters related to Global Change. ($6,142)
	Transport and dispersion research by the Atmospheric Studies in Complex Terrain (ASCOT) moved to a larger mountain-valley system to explore the tie-ins of local circulations to more regional weather systems. Experimental limitations due to enhanced spatial scales was compensated by more elaborate modeling parametric studies. Emergency response research activities concentrated on the incorporation of a forecasting dimension to the Atmospheric Release Advisory Capability (ARAC) system, supported by the Office of Environment, Safety and Health. ($2,890)	The ASCOT program will concentrate on specific problems of transport and diffusion relevant to emergency preparedness. Emphasis will be placed on modeling and experimental investigations providing the scientific tools to serve the DOE facilities with emergency preparedness needs. An upgrade in the forecasting capability of emergency response models for the local and the regional scale will be initiated. Modeling systems addressing reactive fluids will receive increased attention. ($4,520)	The ASCOT program will continue its emphasis on research which can be used by DOE to improve the emergency preparedness and emergency response atmospheric dispersion systems at key DOE sites. Field programs will be conducted around the DOE sites in Oak Ridge, Tennessee. This will also be the first test for the ASCOT models in the eastern mountainous terrain and in humid climates, and a new set of appropriate parameterizations are expected. Pilot studies of uncertainty in emergency preparedness models will be undertaken. ($5,500)
	The study of organic compounds in the atmosphere continued with field measurements taken in conjunction with the PRECP field efforts. Laboratory studies of fundamental chemical processes along with applications of tracer technology was pursued. ($3,129)	The study of the role of organics in regional oxidant and acid production will continue with field and laboratory studies. The impact of sulfate aerosols on cloudiness and radiative balance will be studied in the context of global change. Technology transfer activities with tracers will continue for a variety of industrial applications. ($3,721)	The study of the role of atmospheric organics in global atmospheric chemistry changes will continue. ($1,650)
	$ 11,448	$ 12,281	$ 13,292

III. Environmental Research (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Marine Transport	The marine transport program, has for more than a decade, been focused in the coastal ocean margins for several reasons. Aquatic and atmospheric effluents and discharges from many energy and weapons facilities end up in the coastal zone; the coastal zone is the most productive oceanic renewable resource for commerical and sport fisheries, and 70% of the population lives within close proximity of the ocean. The research conducted in the Northeast, Southeast and Southwest coastal margins is determining the flushing rate and the fate of energy and weapons materials in these regions to address concern of deleterious concentrations of these discharges in the coastal zone. This research is also important in contributing to the knowledge of carbon and nitrogen flux of the coastal margins in the global cycle; since coastal margins are estimated to be providing 80% of the productivity in the entire ocean system and are considered the "missing carbon" in the global CO2 budget. In FY 1989, the Shelf Edge Exchange Program (SEEP) in the Northeast is in the midst of an 18 month field year to determine particle flux from the New York Bight and Delmarva peninsula off the shelf. The Southeast program has shown that the major flushing from the shelf is driven by surface winds, resulting in discharges off the shelf at Cape Hatteras and at Cape Canaveral. The California Basins study (CaBS) in the southwest discovered that 80% of the productivity in the water column is	Because of its expertise in coastal margins research DOE/BER became the lead agency in FY 1989 of a multiagency organization in coastal research. In FY 1990 BER will build closely collaborative programs with other Federal agencies to form a coherent, effective costal margins component of the Global Ocean Flux Study (GOFS) which is a major global change multiagency program. In FY 1990 the Northeast SEEP program will complete its 18 month field year to determine level of discharge of particles from the shelf and begin analyzing samples and synthesizing data. The SAB and CaBS programs will complete synthesis of their field years and prepare advanced planning for the enhanced collaboration with GOFS in FY 1991 and FY 1992. ($6,040)	Formal multiagency planning meetings, field equipment development and buildup and pilot studies will be conducted on the ocean margins as this region begins to accelerate its programs in tandem with the open ocean research of GOFS funded by other agencies. It is closely integrated into the biogeochemical element of the Global change research plan issued by the Committee on Earth Sciences (CES) and will address the role of the ocean margins in exchanges with land and open ocean systems. The BER ocean program will be directed at assessing the quantitative contribution of carbon and other associated chemicals removed from the eastern U.S. continental shelf and advected into the Western North Alantic ocean boundary current system which includes the Gulf Stream. This research will begin to put into perspective the significance of boundary exchanges in biogeochemical cycling of ocean systems, the amount of greenhouse gases absorbad from the atmosphere and the disposition of the carbon in the oceans. This same research will also continue to answer the questions of transport of energy-related contaminants on and off the continental shelf. ($6,901)

III. Environmental Research (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Marine Transport (Cont'd)	due to bacterial activity so that much of the organic material does not fall to the bottom (as is present along the east coast) but remains in the water column with possible gas metabolite discharges into the atmosphere. ($5,779)		
	$ 5,779	$ 6,040	$ 6,901
Terrestrial Transport	Continued research in environmentallly related radon studies to determine aspects of soil types depth and porosity to radon levels, as well as humidity and moisture factors. ($2,417)	Complete research in radon transport from environment to households. ($2,320)	Begin to summarize research findings in radon program on soil mobility through the near surface soils of the U.S. ($2,377)
	Continued development of accurate non-invasive, inexpensive methods including fiber optic sensors to eliminate need of drilling costly wells for monitoring. Strengthened research in understanding capacity of natural soils and subsurface systems to degrade and transport organic chemicals. Began development of expert systems for mixed wastes of organics, radionuclides and trace metals through soils and subsurface systems by targeting on unifying concepts. Continued research in deep microbiology with one new site at Savannah River. Increased technology transfer of newly discovered microbiota to pharmaceutical, waste cleanup, and other industries. Awarded 23 proposals out of 216 submitted in response to a Federal Register Notice for subsurface contaminant research. Areas included radionuclide/organic mixture dynamics, colloid interactions, biodegradation and field scale validation of models. Completed mid- to	Complete first national comparative information base in deep microbiology drawing on western drilling site and the Savannah River site. Initial conclusions on subsurface chemical and physical variables that control microbial presence, abundance and activity are early steps leading to the use of microbial communities for bioremediation of deep aquifers. Maintain long term research on the immobilization and transport of organic-chemical-radionuclide mixtures, and in the physical, chemical and microbiological properties of natural subsoils and groundwater. Initiate first integrated geochemical-microbial experiments where multiple organic contaminants with different sorptive capacities are degraded in presence of microorganisms. No comparable research to clarify coupled processes that operate simultaneously is being done nationally; with time, these systems will be used for research on	Maintain research to develop the first national comparative information base on microbial communities in deep sediments/aquifers to determine if microbial communities in ground water can be predicted based on available physical-chemical monitoring data. Maintain research in the microbial degradation, abiotic degradation and sorptive-desorptive processes that mobilize organic-radionuclide chemical mixtures, and in the hydraulic, geochemical and microbiological properties that encourage their stabilization in subsoils and ground water. Continue research in new generation expert systems related to chemical, and bacterial transport/ degradation that will contribute to biochemical cleanup of contaminated subsurface systems. Increase coordination with all Departmental units by selecting the first validation field site to test scientific concepts and speed transfer

III. Environmental Research (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Terrestrial Transport (Cont'd)	long-term Department research problem definition report directed at cost reduction with safe implementation of environmental remediation, and restoration required in the 5 to 20 year time frame. ($8,075)	alternative remedial action strategies to determine unexplained failures and the boundary conditions for application of new methods. Initiate university-national laboratory cooperation that bridges the gap between experimental research and field demonstrations of effective and economically-improved in situ waste stability. Test and demonstrate new instrumentation within an intermediate scale experimental system. Increase coordination with all Departmental units by selecting the first of five DOE-wide research sites to verify predictions in the field and to speed transfer of new scientific technologies to DOE sites. Hold workshops to develop research implementation of specific areas for cost reduction of environmental remediation and cleanup as a follow up to the mid- to long-term Departmental research problem definition report. ($11,987)	of new scientific methods, such as microbial degradation of organic chemical mixtures under pressure and water flux. ($13,311)
	No activity. ($0)	Implementation plans for the Energy Sciences Network (ESNET) project, identified in the applied mathematical sciences subprogram of the Basic Energy Sciences program will proceed. This subprogram's share for the implementation of ESNET is $49.	Upgrades of ESNET to conform to the National Research and Education Network standards will continue to be pursued and will be shared among ER programs that benefit from ESNET.
	$ 10,492	$ 14,356	$ 15,688

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III. Environmental Research (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Ecosystem Functioning and Response	Began development for next phase of Arctic tundra study in collaboration with NASA, DOI and NSF to broaden understanding of land/atmosphere ecosystem programs as targeted on water balance and atmosphere/land interactions for determination of resiliency of ecosystems to stresses from natural and human induced disturbance. Continued research in watersheds and wetlands to determine effects of multiple stresses. Publication in FY 1989 of 2 synthesis volumes of 3 to 4 decades of research conducted at Hanford and Oak Ridge has provided an important and unique record of ecosystem processes at watershed and landscape sized areas that will form the foundation for enhanced studies now being considered by several agencies related to the global change issue. ($7,166)	State-of-the-art technologies and instruments that are being developed at the national laboratories will be incorporated into field studies to support vertical integration processes and spatial and temporal dynamics. Planning of the hydrosphere/atmosphere/biosphere interactions in terrestrial arctic/arid terrain (HABITAT). The HABITAT program will emphasize processes related to large scale disturbances including evapotranspiration and changes in water balance to understand critical events leading to such an extreme as desertification or resiliency. ($6,044)	The CES global change research plan has identified research on interaction of physical and biological processes as an important priority of ecological systems and dynamics. The existing BER program has had a track record in innovative research in this area through novel instrumentation development and mulidisciplinary research teams. In FY 1991 we will further develop the HABITAT program in both the arctic region and at arid and semi-arid DOE sites to determine biogeochemical cycling and the significant physical and biological driving forces that control ecosystems dynamics. A multiagency program in the arctic centered on the comprehensive DOE Arctic program will begin. ($7,000)
	A comparative study by the DOE Environmental Research Parks network will be conducted using data bases extending over 40 years to establish a regional and national environmental transect. ($523)	The DOE National Environmental Research Park Network with established data bases operating interactively since FY 1990 will be enhanced to become closely integrated with the theoretical ecology program so that field validation of theoretical concepts developed in the FY 1989 and FY 1990 time frame can be effectively accomplished. PARKNET, the interactive DOE Research Park data base network, will be interlinked with the NSF Long-Term Ecological Reserves (LTER) network and the international Man and the Biosphere (MAB) network to begin developing intercontinental transects to identify critical gradients for forecasting global changes. ($600)	The DOE National Environmental Research Park Network with established data bases operating interactively since FY 1990 will be enhanced to become closely integrated with the theoretical ecology program so that field validation of theoretical concepts developed in the FY 1989 and FY 1990 time frame can be effectively accomplished. PARKNET, the interactive DOE Research Park data base network, will be interlinked with the NSF Long-Term Ecological Reserves (LTER) network and the international Man and the Biosphere (MAB) network to begin developing intercontinental transects. ($600)

III. Environmental Research (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Ecosystem Functioning and Response (Cont'd)	Continued momentum in theoretical ecology to provide an underpinning for DOE ecosystem research and for the national global program which is severely lacking in mathematical theory for multiple space-time scales. Augmentation of funds for this program came by terminating the marine physiology program. Sixty proposals were submitted in response to a Federal Register Notice; and 8 were awarded after panel evaluation. ($884)	The freshwater program will be terminated in order to provide additional funds for the DOE theoretical ecology program. ($1,200)	Funding for the theoretical ecology program will continue with no new grants awarded in FY 1991. The awards made from the competition resulting from the Federal Register notices in FY 1989 and FY 1990 will be continued as three year grants from date of inception. This program although small is a crucial underpinning for the entire U.S. national program in terrestrial ecosystem dynamics in global change because of the focused, highly competitive, advanced theory that is required for appropriate experimental implementation and model development that must be based on relevant parameters for cost effective use of funds. ($1,200)
	$ 8,573	$ 7,844	$ 8,800
Environmental Research	$ 36,292	$ 40,521	$ 44,681

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

Preface: Health Effects

Research in this program is conducted to develop a broad, scientifically sound data base for evaluating the potentially adverse health effects that could result from exposures to radiation and chemical agents most relevant to Department of Energy programs. One subprogram utilizes human epidemiolgical data obtained from selected human populations known to have been acutely exposed to moderately high, or to chronically low levels of external radiation, internally deposited radioactive materials, or energy-related materials. The second subprogram is designed to provide experimental health effects data, including data on mechanisms by which health effects are induced and expressed, which cannot be obtained from human studies. This subprogram makes use of experimental animals, as they are useful models for human beings. In addition, animal organ and tissue cultures, as well as aminal and human cell cultures, are extensively used. Both subprograms will increasingly emphasize molecular-level studies. There is also a small subprogram in radiation and chemical physics that addresses the physical mechanisms of radiobiological action.

II. A. Summary Table: Health Effects

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Human Health Research				
RERF Epidemiology	$ 17,000	$ 17,255	$ 18,000	+ 4
DOE Workers and Other Epidemiology	8,187	12,789	13,636	+ 7
Other Human Health	1,468	2,453	2,406	- 2
Subtotal, Human Health Research	$ 26,655	$ 32,497	$ 34,042	+ 5
Biological Research				
Radiation Biology	$ 23,360	$ 24,683	$ 22,923	- 7
Chemical Toxicology	8,387	7,884	9,155	+ 16
Subtotal, Biological Research	$ 31,747	$ 32,567	$ 32,078	- 2
Radiological and Chemical Physics	$ 6,464	$ 6,395	$ 7,000	+ 9
Total, Health Effects	$ 64,866	$ 71,459	$ 73,120	+ 2

II. B. Major Laboratory and Facility Funding

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Argonne National Laboratory	$ 7,072*	$ 6,596	$ 7,072	+ 7
Brookhaven National Laboratory	$ 626	$ 1,048	$ 687	- 34
Inhalation Toxicology Research Institute	$ 7,890	$ 7,258	$ 7,868	+ 8
Laboratory of Radiobiology and Environmetal Health	$ 788	$ 791	$ 845	+ 7
Lawrence Berkeley National Laboratory	$ 1,864	$ 1,841	$ 1,888	+ 3
Lawrence Livermore National Laboratory	$ 1,304	$ 1,607	$ 1,175	- 27
Los Alamos National Scientific Laboratory	$ 2,251	$ 2,633	$ 2,378	- 10
Oak Ridge Associated Universities	$ 3,900	$ 4,494	$ 4,157	- 7
Oak Ridge National Laboratory	$ 7,584	$ 6,349	$ 6,453	+ 2
Pacific Northwest Laboratory	$ 5,752	$ 6,420	$ 6,803	+ 6
Radiation Effects Research Foundation	$ 17,000	$ 17,255	$ 18,000	+ 4
Sandia National Laboratories	$ 500	$ 737	$ 950	+ 29

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Health Effects			
Human Health Research			
RERF Epidemiology	Studies of atomic bomb survivors begin to incorporate new dosimetry. Studies of immunological responses, somatic, mutations and biological dosimetry published. ($17,000)	Maintain level of effort for atomic bomb survivor studies. ($17,255)	Maintain level of effort for atomic bomb survivor studies. ($18,000)
	$ 17,000	$ 17,255	$ 18,000

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III. Health Effects (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
DOE Workers and Other Epidemiology	Studies of workers at the Savannah River Plant (SRP), Hanford Site, and Mound Facility are published in peer-reviewed scientific journals. National and international data pooling efforts result in report to be submitted for publication and development of cooperative study protocol. Development of a Centralized Epidemiologic Data Resource (CEDR) begins. ($8,187)	Data pooling efforts using data from published studies reach conclusion. CEDR development accelerates with survey of DOE sites and establishment of interim data repository. Plutonium morbidity study begins. Initiate data collection at remaining National Laboratory sites (Idaho Engineering, Argonne, Brookhaven and Ames). Initiate feasibility study of hazardous waste cleanup workers. Expand Health Surveillance Sytem and Study of Injuries and Accidents to additional facilities. ($12,789)	Develop standardized system for determining exposures to chemicals throughout the DOE system. Complete autopsies/tissue analyses now on hold. Install data from completed studies in interim CEDR. Initiate roster construction/verification for National Laboratory workforces in preparation for submission to Social Security Administration (SSA) for vital status determination. Continue Pu morbidity study data collection. Accelerate CEDR data collection. Obtain computerized detailed work history data for SRP workers. Prepare rosters of Nevada Test Site civilian workers, including employees of Holmes and Narver and REECo. Continue data collection at National Laboratories and expansion of Health Surveillance System and Injury/Accident Study. Initiate study of hazardous waste cleanup workers, if feasible. Begin incorporation of chemical exposure information in data collection. Install PAREP data in CEDR. ($13,636)
	$ 8,187	$ 12,789	$ 13,636
Other Human Health	Support continues for interagency radiation policy and radon work-group efforts. Two technical publications on radon completed, uranium miner tissue bank begun and DOE human subjects policies development begun. Indoor exposure model developed. ($1,468)	Continue interagency radon and radiation efforts, accelerate efforts on radon publications, and DOE implementations, and DOE implementation of human subject protection. Complete major radon program review. Begin radon risk analysis task to evaluate new science versus uncertainty reduction. ($2,409)	Continue to expand radon publication series, implement radon review recommendations, begin Human Subject research system, and increase interagency coordination efforts for radiation, radon, human subjects protection. ($2,406)

III. Health Effects (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Other Human Health (Cont'd)	No activity. ($0)	Implementation plans for the Energy Sciences Network (ESNET) project, identified in the applied mathematical sciences subprogram of the Basic Energy Sciences program will proceed. This subprogram's share for the implementation of ESNET is $44.	Upgrades of ESNET to conform to the National Research and Education Network Standards will continue to be pursued and will be shared among ER programs that benefit from ESNET.
	$ 1,468	$ 2,453	$ 2,406
Subtotal, Human Health Research	$ 26,655	$ 32,497	$ 34,042
Biological Research			
Radiation Biology	Long-term carcinogenesis studies are in the data analysis and writing stages at all laboratories, although several experiments still have living animals. The direction and approach to archiving the information from past experiments was formalized. A peer review was held of the plans to store tissues from these experiments for use in cellular and molecular biology studies. Radon/radon daughter research matured and an increased level of project integration was attained. Cellular dosimetry and effects in the respiratory tract following inhalation of radon and radon mixed with cigarette smoke were pursued. The integration of animal research models with cellular and molecular research models continued toward the end of understanding the mechanisms underlying radiation carcinogenesis. ($11,710)	Continue data analysis and publication of information from the long-term Beagle dog studies. Implement the interlaboratory collaboration necessary to create an integrated radiobiology database for the long-term experiments. This will require increased support for the repository and archiving processes. Continue radon studies, standardize approaches to dosimetry of radon exposures. Start new multi-level studies which implement a combined whole animal, cellular and molecular level approach to the mechanisms of radiation carcinogenesis. Increase support for the animal and cellular-molecular studies of the effects of low level doses and dose rates of neutrons and gamma rays at the Argonne National Laboratory using the Janus reactor. Increase support for high-LET research at the Bevatron, to observe effects on Harderian gland cells. ($12,430)	Support will be continued for the repository and archiving process on the tissues and information from the long-term animal studies. Experiments on stored tissues will aid in elucidating the mechanisms of radiation-induced cancers. Some of the radon/radon daughter experiments will be nearing completion and publication. As the whole animal studies phase down, there will be more emphasis on intergrated research approaches which simultaneously span molecules, cells and whole animals. These new approaches promise to produce an in-depth understanding of the mechanisms involved in tumor development. Support will continue for the animal and cellular-molecular studies of radiobiological effects of low level neutron and gamma ray exposures and for the high-LET studies using different heavy nuclei at various doses and dose rates. The subcontracted research effort between the University of Utah and the Inhalation Toxicology Research Institute will continue its phase down. ($10,155)

III. Health Effects (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Radiation Biology (Cont'd)	Continued research on the molecular biology of radiation-induced heritable mutations in mice and on somatic mutations in human skin and blood cells. Research on radiation-induced DNA damage and repair sustained. Studies on the role of radon-induced gene damage in relation to the initiation of tumor development continued. Research continued on the development of new and improved molecular and cellular based systems to measure possible radiation-induced somatic and heritable mutations in human populations. ($11,650)	Cellular and molecular studies selectively increase. The molecular level analysis of germ life and somatic mutations induced by high--as well as low-LET radiation continues. Research emphasizes the confirmation of observations of the perferential repair of damaged DNA that is inactive. Studies on the molecular and cytogenetic characterization of radiation-induced damage that is biologically significant and the role of such damage in lung carcinogenesis continue. Validate improved molecular and cellular based mutation assays for the quantitation of somatic and heritable mutations in radiation exposed human populations. ($12,253)	Research investigating the molecular and cellular mechanisms underlying radiobiological damage and carcinogenesis will be increased. Studies of malignant transformation using human cell cultures and combined in vitro and in vivo approaches will be emphasized. Increased effort will be placed on understanding the relationship between DNA repair capacity and tumor development. Some of these studies will utilize transgenic mice in which particular DNA repair genes have been introduced. Studies on the molecular and cytogenetic characterization of radiation-induced damage to pulmonary tissue components will continue. Molecular analysis and characterization of tumor tissue from radium dial painters will continue. Studies to perfect assays for the quantitation of somatic and heritable mutations in humans will be increased in scope as new technologies are developed in the human genome program. ($12,768)
	$ 23,360	$ 24,623	$ 22,923
Chemical Toxicology	Multilevel fundamental research to elucidate general principles of chemical effects was emphasized. This research emphasizes understanding the cellular and molecular events following exposure and used novel systems designed to bridge in vivo and in vitro generated information. Emphasis remained on carcinogenesis and genetic effects. ($8,387)	This research includes studies on the interactions of defined multiple exposures and extends the use of molecular biology approaches involving effects of inhaled chemicals and metabolic changes in the respiratory tract. Continue to emphasize mechanisms of carcinogenesis and mutagenesis as primary effects and inhalation toxicity as the primary exposure route. Increased emphasis on integration of research efforts across the program element. ($7,884)	The program will continue developing data for the evaluation of potential adverse effects of energy-related chemicals on humans through multifaceted biological research. The focus will be on fundamental principles of chemical interactions with living systems, emphasizing cellular and molecular mechanisms. The research will include studies on mechanisms of synergistic and antagonistic interactions and mechanisms of carcinogenesis, including DNA adducts, cellular oncogene activation and tumor promotion. Research will be continued

III. Health Effects (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Chemical Toxicology (Cont'd)			to bridge information between molecular and cellular studies and animal studies. Emphasis will remain on carcinogenesis and mutagenesis, and upon inhalation as a primary route of exposure. ($9,155)
	$ 8,387	$ 7,884	$ 9,155
Subtotal, Biological Research	$ 31,747	$ 32,567	$ 32,078
Radiological and Chemical Physics	Maintain radiation biophysics research to obtain insights into the basic mechanisms of radiation interactions with matter. Apply this understanding to the interpretation of radiobiological response. Emphasize the extrapolation of gas phase data to the condensed phase. Initiate theoretical studies on conformation and configuration changes in model systems produced by interaction with physical and chemical agents. ($3,431)	Continue radiation biophysics research and basic studies of radiation interactions with matter. Emphasis will be on condensed phase data which will provide insight into reactions with biological tissues. Sustain theoretical studies on structural and conformational changes in model systems caused by chemical and physical agents. ($3,377)	Radiation biophysics and fundamental studies on interaction of radiation with matter will continue. Application of this research to the understanding of radiobiological effects at low doses and dose rates will continue. Continued emphasis will be placed on obtaining data in condensed phase. Theoretical studies on understanding of conformational and structural changes in biomolecules caused by radiation and chemical agents will continue. ($3,700)
	Sustain the fundamental studies on energy transfer and transport properties of model liquids. Emphasize studies on model liquids that are similar in chemical composition to that found in cellular environment. An advanced qualitative image processing system will be developed for fluorescence hybridization studies of the response of cells to low doses of radiation or other agencts. ($3,033)	Continue to maintain basic studies on understanding of energy transfer pathways and influence of these energy transfers on the physical and chemical properties of the liquid. Strengthen the computation and calculation capabilities to better define the structure-reacting relationship in liquids. Hardware and software improvements will be developed for dual beam flow cytometry to incorporate light scatter measurements. ($3,018)	Basic studies on identifying and elucidating the mechanisms of energy transfer processes in biologically relevant model liquids will continue. Application of this knowledge in understanding the changes that are produced in physical and chemical properties of these liquids will be emphasized. Theoretical computational techniques will be emphasized to better define the structure-activity relationship of these liquids. ($3,300)
	$ 6,464	$ 6,395	$ 7,000

III. Health Effects (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Health Effects	$ 64,866	$ 71,450	$ 73,120

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

I. Preface: General Life Sciences

Research in General Life Sciences contributes to the base of fundamental biological knowlege that is required for the effective study and interpretation on energy-related health effects. It also identifies early indicators of biological damage, develops new techniques and experimental systems for research use, and provides knowledge that eventually becomes used in the estimation of human health risk. This research area will provide additional support to accelerate mapping of the entire human genome by improving the DNA-sequencing technology, developing new instrumentation and applying robotics technology where possible. This program applies modern molecular biology to the study of radiation and chemical health effects and also exploits unique Departmental facilities for structural biology and genome research.

II. A. Summary Table: General Life Sciences

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Structural Biology	$ 6,804	$ 8,382	$ 10,400	+ 24
Molecular Biology	12,604	13,446	14,400	+ 7
Cellular Biology	8,478	8,441	9,470	+ 12
Genome	17,505	25,975	45,892	+ 77
Total, General Life Sciences	$ 45,391	$ 56,244	$ 80,162	+ 43

II. B. Major Laboratory and Facility Funding

Ames Laboratory	$ 150	$ 172	$ 200	+ 16
Argonne National Laboratory	$ 1,348	$ 1,383	$ 1,708	+ 23
Brookhaven National Laboratory	$ 5,826	$ 5,902	$ 6,495	+ 10
Laboratory of Radiobiology and Environmental Health	$ 2,240	$ 2,236	$ 2,375	+ 6
Lawrence Berkeley National Laboratory	$ 4,922	$ 6,071	$ 5,854	- 4
Lawrence Livermore National Laboratory	$ 6,564	$ 8,003	$ 6,229	- 22
Los Alamos National Scientific Laboratory	$ 7,691	$ 8,949	$ 9,239	+ 3
Oak Ridge Associated Universities	$ 500	$ 497	$ 540	+ 9
Oak Ridge National Laboratory	$ 5,405	$ 6,248	$ 6,595	+ 6
Pacific Northwest Laboratory	$ 355	$ 390	$ 411	+ 5

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
General Life Sciences			
Structural Biology	Continued support of the user facilities at the national laboratories. At the National Synchrotron Light Source, developed the use of extremely intense non-monochromatic x-ray beams for special crystallography. Continue development of high counting rate two-dimensional detectors to realize the full capabilities of the x-ray beams from the light source. Began studies of an unusual RNA that catalyzes changes in itself, a self-processing RNA, and of the use of antibodies to create specific catalytic sites. Began development of a low Q diffractometer for biological experiments at the LANL pulsed neutron source. Began development of microimaging techniques using high brightness electron and x-ray sources to study protein and DNA structure. ($6,804)	Maintain support of the user program in structural biology at the National Laboratories. At the UV ring of the NSLS, expand the range and capabilities of vacuum ultraviolet spectroscopy, especially for studies of nucleic acids. Continue development of the high counting rate 2-D detectors for counting photons at Brookhaven and Argonne. With completion of construction of the low Q diffractometer and development of data reduction software, initiate structural studies at the pulsed neutron source of proteins and chromatin. Determine the atomic structure of several forms of cancer-related proteins coded by oncogenes. Develop plans and priorities for biological research at the planned Advanced Neutron Source at Oak Ridge, and the planned synchrotron light sources at Argonne and the Lawrence Berkeley Laboratory. ($8,382)	Studies will be made of the structure of chromosomes and ribosomes by means of small angle neutron scattering and scanning transmission electron microscopy and will include the construction of a synthetic chromatin to model chromosome fragments. Development of advanced high speed X-ray detector systems for use at synchrotron facilities will be accelerated. At the NSLS the techniques for single crystal X-ray diffraction will be expanded by the use of multi-wavelength anomalous diffraction, and Laue diffraction. A small angle X-ray spectrometer that will permit rapid automated structural studies will be in routine use for studies of oriented biological materials such as membranes. At LANL, a ferrofluid has been designed in which suspensions of chromatin or an enlongated virus could be aligned by a small magnetic field. This development raises the possibility for understanding higher order structures in chromatin fibers. Studies of the structure of proteins and nucleic acids in several laboratories, principally by X-ray analysis and nuclear magnetic resonance are providing important information on the forces keeping molecules stable and the differences between normal and abnormal molecules. Research on direct microimaging techniques for biological structures will be conducted using high brightness, coherent X-ray sources which will permit construction of high spatial resolution X-ray microscopes and X-ray holographic imaging devices. ($10,400)

III. General Life Sciences (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Structural Biology (Cont'd)	$ 6,804	$ 8,382	$ 10,400
Molecular Biology	Continued molecular characterization of DNA damage from radiation and of the genes coding for DNA repair with particular emphasis on characterizing the molecular mechanisms and controlling factors in human DNA repair; sustained research on the molecular characterization of gene structure and expression. ($12,604)	Emphasize chemical and physical characterization of biologically significant DNA damage from high LET radiation; continue research on nonrandom repair of genomic damage in mammalian cells; investigate the functional and evolutionary significance of the conserved telomeric repeat sequences of mammalian chromosomes; characterize the molecular nature of heritable mutations in mice. ($13,446)	Much of this program is aimed at investigating the nature of DNA lesions produced by radiation and other environmental agents and elucidating the mechanisms by which these lesions are produced, modified and repaired. New fluorescent techniques utilizing molecular probes for the detection and quantitation of genetic damage will be developed. A variety of model systems will be exploited to understand the factors regulating the expression of particular genes. Efforts to isolate, clone and characterize human DNA repair genes will expand. ($14,400)
	$ 12,604	$ 13,446	$ 14,400
Cellular Biology	This research emphasized development of the basic knowledge of cell structure and function necessary to understand cellular responses to radiation and chemical exposures and development of better experimental models. Selected mammalian cells and specific cellular processes were studied to identify the genetic and epigenetic factors that control cell transformation, cell division, and cell differentiation. Much of this program is related to basic cancer biology focusing on the role of karyotype instability, and other cytogentic and molecular changes in the initiation and progression of tumorigenesis. ($8,478)	Continue fundamental research on cell replication and regulation in normal and perturbed mammalian cells that are progressing toward a malignant state. Continue exploitation of a battery of repair-deficient mutants to characterize and clone human DNA repair genes. Sustain efforts to determine the mechanisms by which perturbation in the extracellular matrix and cell membrane receptors influence carcinogenesis. Continue investigations of the cells at risk and the cellular mechanisms involved in the development and progression of lung diseases caused by inhaled substances. ($8,441)	The overall scope of the program will continue. Studies will continue on the regulation of gene expression in particular cell types, on mammalian germ cell biology, on the metabolism, regulation and function of lipids in mammalian cells, and on the responses of cells to freezing and thawing. Particular emphasis will be placed on improving flow cytometric analytical cytology methodology and the validation and application of a flow cytometric procedure to detect and enumerate variant human red cells that are produced by mutational events that occur in the bone marrow and result in the loss of cell surface glycophorin A. New research applying analytical cytology to the study of hematopoiesis will be initiated. ($9,470)

III. General Life Sciences (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Cellular Biology (Cont'd)	$ 8,478	$ 8,441	$ 9,470
Genome	Maintained the production and application of human chromosome-specific gene libraries at the National Laboratories; substantially accelerated the development of linearly ordered sets of large DNA fragments from human chromosomes. Increased development of human monochromosomal hybrid cell lines. Developed new approaches to creation of physical maps of human chromosomes. Increased efforts to improve, develop and evaluate DNA-sequencing and related technologies, including microimaging techniques, needed for characterization of the human genome. Supported development of productive interdisciplinary human genome centers at LANL and LLNL. In conjunction with NIH and other organizations, sponsored joint workshops and began to develop a joint plan for the national human genome program. ($17,505)	Enhance DOE effort in the human genome program by expanding the program to include the following activities: initiate ordering of cloned DNA fragments for several chromosomes where this is not already underway; provide necessary support to DOE Human Genome Centers and other large interdisciplinary efforts to create the necessary critical mass; build prototype technology for testing and validation; evaluate new sequencing technologies, including direct microimaging approaches; develop and test new computer hardware and software for analysis of nucleic acid sequences and the relationship between nucleic acid sequences and protein structures. With NIH, complete the national plan for the human genome program. ($25,876)	Continue the development of resources and technologies and emphasize automation and robotization of state-of-the-art capabilities for sequencing DNA; promote the development of innovative DNA sequencing technologies including direct imaging methods, design and apply the software needed to manage and analyze data; begin the linear ordering of sets of DNA fragments for additional chromosomes; provide support for distribution of these resources from National Laboratories; establish human genome postdoctoral fellowships for training interdisciplinary specialists; and facilitate transfer of technologies from labs to the private sector. Emphasize the development of new innovative DNA sequencing strategies and the computational capabilities needed to manage and manipulate physical map and DNA sequence data; expand the effort to construct physical maps of each human chromosome. ($45,882)
	No activity. ($0)	Implementation plans for the Energy Sciences Network (ESNET) project, identified in the applied mathematical sciences subprogram of the Basic Energy Sciences program will proceed. This subprogram's share for the implementation of ESNET is $99.	Upgrades of ESNET to conform to the National Research and Education Network standards will continue to be pursued and will be shared among ER programs that benefit from ESNET.
	$ 17,505	$ 25,975	$ 45,892
General Life Sciences	$ 45,391	$ 56,244	$ 80,162

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

I. Preface: Medical Applications

Medical Applications research involves a wide range of projects directed to clinical and other benefical applications of energy-related technologies. Radiopharmaceuticals research involves development of and/or biomedical studies with new radiopharmaceuticals, largely in studies of brain and heart metabolism, but also in diagnosis and therapy involving other organs. Clinical feasibility research includes in-vivo testing of new radiopharmaceuticals in animals and subsequently in selected patients. Methods are evaluated for the study, diagnosis, and treatment of disease such as cardiopulmonary disease, mental disorders, cancer, and metabolic disorders. The instrumentation program focuses primarily on advanced detector research, improved resolution of positron emission tomography and other imaging techniques. Particle beam, heavy ion therapy, and boron neutron capture therapy research is conducted to treat inoperable tumors in the brain.

II. A. Summary Table: Medical Applications

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Stable Isotope Research	$ 800	$ 788	$ 940	+ 19
Radioisotope Development	3,153	2,552	2,600	+ 2
Radiopharmaceuticals	16,000	18,397	18,400	0
Instrumentation	3,097	3,333	3,315	- 1
Clinical Feasibility	3,757	4,616	4,525	- 2
Boron Neutron Capture Therapy	9,346	7,621	7,235	- 5
Total, Medical Applications	$ 36,153	$ 37,307	$ 37,015	- 1

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory	$ 392	$ 378	$ 380	+ 1
Brookhaven National Laboratory	$ 6,777	$ 7,350	$ 8,500	+ 16
Idaho National Engineering Laboratory - EG&G	$ 6,527	$ 5,191	$ 3,200	- 38
Lawrence Berkeley National Laboratory	$ 2,885	$ 2,775	$ 2,705	- 3
Lawrence Livermore National Laboratory	$ 560	$ 607	$ 400	- 34
Los Alamos National Scientific Laboratory	$ 2,900	$ 1,908	$ 2,435	+ 28
Mound Facility	$ 750	$ 493	$ 500	+ 1
Oak Ridge Associated Universities	$ 1,024	$ 855	$ 881	+ 3
Pacific Northwest Laboratory	$ 13	$ 12	$ 13	+ 8
Oak Ridge National Laboratory	$ 1,700	$ 1,771	$ 1,818	+ 3

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Medical Applications			
Stable Isotope Research	Completed studies of the applications of stable isotopes to the study of biological systems at LARL. Continued FY 1988 activities on the development and separation technique for stable isotopes and on the development of microwave spectroscopy for determining isotope ratios. ($800)	Continue FY 1989 program level of activity. Initiate research on the applications of NMR spectroscopy to provide a noninvasive, non-radioactive method to investigate structure and metabolism in vivo in real time. ($788)	Continue research on the development of advanced nuclear magnetic resonance techniques for imaging the distribution of stable isotopes in humans and animals in real-time without use of ionizing radiation. ($940)
	$ 800	$ 788	$ 940
Radioisotope Development	Continued FY 1988 program level of activity. Initiated feasibility study for single photon emission computed tomography. ($3,153)	Continue FY 1989 program and initiate efforts to produce new radionuclides to support the research on monoclonal antibodies and PET. ($2,552)	Identify new radionuclides which provide new methods of diagnosis and therapy and aid in quantitative assessment of biochemical processes and perform nuclear and chemical research for their production. ($2,600)
	$ 3,153	$ 2,552	$ 2,600
Radiopharmaceuticals	Continued FY 1988 program for new radiopharmaceuticals labeled with positron and single photon radionuclides to study details of biochemical processes on a quantitative and non-invasive basis. Continued immunoconjugates/PET research.	Continue FY 1989 program and initiate efforts to apply advanced computational techniques from the field of quantum pharmacology to increase our knowledge of identifying mechanisms and pathways of diffusion, transport and segregation of chemical compounds in target tissues and organs.	Continue FY 1990 program and improve development of receptor-binding agents for more selective localization of various radionuclides in specific tissues or organs.
			Develop a more complete understanding of the basic radiochemistry for improved Tc-99m agents for brain and heart imaging. ($18,400)
	$ 16,000	$ 18,397	$ 18,400

III. Medical Applications (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Instrumentation	Research on positron emission tomography, magnetoencephalography and other medical imaging instrumentation continued. The feasibility of magnetic resonance imaging of stable isotopes in the body was explored. Development of a new portable device for rapid, bedside evaluation of pulmonary edema was completed. ($3,097)	A new approach to ultra-high resolution positron emission tomography which will eliminate the need for mechanical sampling motion and which can be extended to a multi-ring configuration will be tested. Single photon emission computed tomography (SPECT) is an established and very useful technique to detect a variety of tumors and other lesions. New detection concepts will be examined which offer high sensitivity and spatial resolution along with mechanical simplicity. High intensity monochromatic x-ray beams from synchrotron light sources share great promise in imaging coronary arteries for early detection of heart disease. Development of technology for other potential applications in neuroradiology and tumor diagnosis will be initiated. ($3,333)	Research on high resolution Positron Emission Tomography (PET) and Single Photon Emission Computed Tomography (SPECT) systems will be maintained with emphasis on true three-dimensional imaging capabilities. In-vivo computed tomography using a new beam line at the National Synchrotron Light Source equipped with a superconducting wiggler insertion device will be applied in multiphoton absorption studies to image brain tumors, especially pituitary adenomas and cerebral gliomas, and atherosclerotic plaques in major arteries. New biomedical generators for positron emitting isotopes will be explored for tumor imaging and for studying bone and brain metabolic processes. Development of a compact, portable instrument for monitoring the course of pulmonary edema at the hospital bedside or outpatient clinics will be completed. Development of magnetoencephalography instrument for non-invasive brain function studies will be continued. ($3,315)
	$ 3,097	$ 3,333	$ 3,315
Clinical Feasibility	Rubidium-82 was studied as a possible blood brain barrier permeability marker for evaluation of the radiation effects from heavy ion radiotherapy.	Pet with Rb-82 will be used to evaluate the integrity of the blood-brain barrier in 50 patients who have undergone radiotherapy. The study will be 2 to 5 years in duration.	Continue FY 1990 program, and develop pharmacologic strategies to enhance retention of radiolabeled monoclonal antibodies (MoAbs) in tumor cell targets.
	Approximately 15 patients were studied for the response of normal tissue at periods of one month and six month post treatment. The usefulness of copper-64 in cardiovascular disease and soft tissue tumors as well as hepatic disease was investigated.	Absolute measurement of radionuclide uptake in patients will be validated using a calibration phantom methodology.	Develop a novel method to covalently link stable clusters of gold atoms to antibodies to improve antigenic specificity and capacity.

III. Medical Applications (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Clinical Feasibility (Cont'd)	Verification of dosimetry predictions and therapy feasibility in patients using selected Iodine-131 and copper-67 radioimmunopharmaceuticals was studied.	Continue development and assessment of new radiochemically engineered radioimmunopharmaceuticals.	Use clinically relevant isotopes Iodine-131, Indium-111, and Yttrium-90, conjugated to monoclonal and polyclonal antibodies to develop improved SPECT imaging for treatment planning for cancer patients undergoing radioimmunotherapy.
	Research into the therapeutic and diagnostic applications of heavy ion beams was expanded and the possibility of applying radioactive beam techniques to cerebral blood flow measurement was explored. Continued clinical trials of synchrotron x-ray angiography. ($3,757)	Develop stereotactic heavy-ion radiosurgery using heavier charged particles at the Bevalac, taking advantage of the physical characteristics of carbon and neon for improved dose-localization and dose-distribution in brain and to transfer the technology to the public sector. ($4,616)	Develop a better understanding of time-dose-volume-fractionation relationships for heavy-ion focal irradiation of human brain. ($4,525)
	$ 3,757	$ 4,616	$ 4,525
. Boron Neutron Capture Therapy	Data on the second generation compound, boron sulfhydrl (BSH) has been submitted to FDA for an IND for pharmacokinetic studies involving critically ill glioma patients.	New chemical approaches to third generation boron compound development will be initiated. The most promising boron-containing compounds, nucleosides, porphyrins, low density lipoproteins, amino acids, antibodies and liposomes will be tested in animal tumor models.	Work described in the previous years will continue. BNCT clinical trials with second generation compounds will be initiated. Efforts will be initiated to target boron to other types of tumors.
	Pharmacokinetics of boron compounds in normal and tumor-bearing rats was continued as well as studies of toxic effects and survival of irradiated glioma cells with and without boron.	The development of rapid methods for measuring boron concentrations in blood and tissues will continued.	Continue to develop a more thorough knowledge of the boron kinetics and the toxicity of the third generation compounds.
	Pharmacokinetics studies of spontaneous canine brain tumors, blood clearance studies in normal dogs, effectiveness studies of beam components, and tolerance of normal brain to neutron irradiation was also conducted.	Examination of normal endothelial cell damage will be further evaluated. Complete sufficantly detailed studies of crucially important biological and biochemical parameters of BNCT using proven in vivo experimental brain tumor models.	

III. Medical Applications (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Boron Neutron Capture Therapy (Cont'd)	Studies were begun on the treatment of human malignant melanoma cell lines in vitro. Boron compound biodistribution and tumor uptake experiments with the human melanoma cells in nude mice were initiated.	The in vitro cell irradiations will be finished. Fractioned dose experiments will be initiated in human melanoma models. Studies will be initiated to directly compare the efficiency of thermal and epithermal neutron beams for treatment of malignant melanoma.	The BNCT experiments of single session irradiations in the human melanoma model will be finished. The fractionated BNCT experiments will continue; the results will be compared to single session treatment. The comparison of thermal and epithermal neutron beams for BNCT in the rabbit eye tumor model will be completed.
	Studies were initiated on the development of a non-reactor source of epithermal neutrons. The aim is to develop a versatile neutron irradiation facility for BNCT based on accelerator production of epithermal neutrons via 7Li(p,n)7Be nuclear reaction.	Neutron and proton transport simulations will be completed to aid in the design of neutron collimators and shielding for tissue and tumor irradiation. Studies will be initiated to characterize the proton beam interaction with lithium and verify the characterisitcs of the epithermal neutrons.	Neutron and proton transport studies will be completed. Experiments will be designed to measure neutron and photon spectra to verify the calculated performance of the lithium target and the neutron collimator.
	$ 9,346	$ 7,621	$ 7,235
Medical Applications	$ 36,153	$ 37,307	$ 37,015

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

I. Preface: Carbon Dioxide Research

The link between carbon dioxide and the greenhouse effect or global warming has become a national and international issue with possible serious impacts on energy policy, economic development and national security. Although the science base for the greenhouse effect issue is insufficient for policy action, there is considerable pressure for a quick legislative fix and for international treaties to limit worldwide emissions of greenhouse gases. Additional funds are requested in FY 1991 to accelerate global warming research particularly in the area of rapidly improving the capability to predict global and regional climate change. Empahsis is placed on experimental studies of the cloud-climate feedback and on innovative hardware-software applications to the advanced climate models.

II. A. Summary Table: Carbon Dioxide Research

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Carbon Cycle	$ 3,425	$ 3,200	$ 3,200	0
Climate Modeling and Diagnostics	6,954	20,000	24,000	+ 20
Oceans Research	714	3,000	3,000	0
Quantitative Links	0	13,000	21,000	+ 62
Vegetative Effects	3,787	7,200	7,200	0
Resource Analysis and Education	1,200	1,800	5,700	+217
Information and Integration	1,289	1,846	1,800	- 2
Total, Carbon Dioxide Research	$ 17,369	$ 50,046	$ 65,900	+ 32

II. B. Major Laboratory and Facility Funding

Brookhaven National Laboratory	$ 1,030	$ 1,134	$ 1,445	+ 27
Oak Ridge Associated Universities	$ 0	$ 142	$ 0	-100
Lawrence Berkeley National Laboratory	$ 0	$ 0	$ 250	+999
Lawrence Livermore National Laboratory	$ 3,770	$ 4,551	$ 7,079	+ 56
Oak Ridge National Laboratory	$ 4,845	$ 2,506	$ 5,710	+128
Pacific Northwest Laboratory	$ 1,714	$ 886	$ 2,800	+216

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III Activity Descriptions (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Carbon Dioxide Research			
Carbon Cycle	Continued to study global sources and sinks of CO2 and other greenhouse gases. ($3,425)	Continue to study global sources and sinks of CO2 and other greenhouse gases. Start the development of an operational carbon cycle model. ($3,200)	Continue acquisition of emissions and atmospheric CO2 data; pursue the development of ocean-atmosphere CO2 models and initiate the parameterization of terrestrial-atmospheric CO2 exchange. Develop an operational global carbon cycle model and apply to scenarios of global energy emissions and changing properties of the global carbon system. Expand acquisition of data on global sources and sinks of CO2, methane and other greenhouse gases and incorporate biological process functions into global carbon cycle models. Explore how natural processes (e.g. reforestation) and biotechnology can alter fluxes of CO2 and methane to slow the rate of atmospheric increase. Identify natural and anthropogenic feedbacks between the global carbon system and climate. ($3,200)
	$ 3,425	$ 3,200	$ 3,200
Climate Modeling and Diagnostics	Implemented the global climate diagnosis and intercomparison program with added scientific collaboration with Canada, Germany and the USSR, and conducted research to improve global data and methods to simulate clouds. ($6,954)	Continue implementation of the climate modeling diagnostic program at LLNL. Commence diagnostic experiments with fixed ocean surface temperature and continue comparisons of model output to observe data for various historical records. Start development of required data bases over long time periods and multiple climate elements. ($12,000)	Complete implementation of the climate modeling diagnostic program at LLNL. Complete diagnostic experiments with fixed ocean surface temperatures and begin experiments to test model validity on select cases of regional interannual variability; continue comparisons of model output to observe data for the prehistorical, historical and modern records. Expand development of required data bases over long time periods and multiple climate elements (e.g. extreme events). Expand numerical experiments within the model diagnostic research program to include

III. Carbon Dioxide Research (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Climate Modeling and Diagnostics (Cont'd)			Increased model resolution and improved convection algorithms. ($12,000)
		Launch research activities associated with the DOE Computer Hardware, Advanced Mathematics and Model Physics (CHAMMP) program. Through an open solicitation process a science team will be selected to identify and explore the most promising approaches to rapidly improving climate modeling capabilities. ($5,000)	Expand research activities associated with the Computer Hardware, Advanced Mathematics and Model Physics (CHAMMP) initiative. Applications of innovative hardware systems such as massively-parallel processing or "thinking machine" concepts will be made to the set of differential equations simulating the climate system. Corresponding advances are expected in the associated software algorithms. Hardware and software improvements are expected to pave the way to the next generation physical parameterizations of the key processes of the climate system. The objective is to develop climate change predictive capability at the regional level. ($5,000)
		Utilize the eight-processor Cray 2 and its successor Cray 3 to provide enhanced supercomputing capability to the climate modeling community. ($2,699).	A significant fraction of DOE's Cray 3 supercomputer will be dedicated to climate modeling activities. This will allow extended climate prediction runs for both the current climate models as well as for the first version of the Advanced Climate Model (ACM) being developed by CHAMMP. ($3,000). A critical data needs study will be undertaken to determine suitability of data sets to first detection potentials as well as to climate model initialization and validation. ($4,000).

III. Carbon Dioxide Research (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Climate Modeling and Diagnostics (Cont'd)	No activity. ($0)	Implementation plans for the Energy Sciences Network (ESNET) project, identified in the applied mathematical sciences subprogram of the Basic Energy Sciences program will proceed. This subprogram's share for the implementation of ESNET is $301.	Upgrades of ESNET to conform to the National Research and Education Network standards will continue to be pursued and will be shared among ER programs that benefit from ESNET.
	$ 6,954	$ 20,000	$ 24,000
Oceans Research	Supported ocean carbon measurements in cooperation with the international World Ocean Circulation Experiment (WOCE). ($714)	Continue to support the ocean carbon measurements in cooperation with the international World Ocean Circulation Experiment (WOCE) and the Global Ocean Flux Study (GOFS), including the sea measurements, onshore laboratory verification and data processing. Expand the research to include the ocean's ability to store and transport carbon particularly by studying the ocean's biology and the climate feedback on ocean biology. ($3,000)	Continue to support the ocean carbon measurements in cooperation with the international World Ocean Circulation Experiment (WOCE) and the Global Ocean Flux Study (GOFS), including the sea measurements, on shore laboratory verification and data processing. Expand the research to include the ocean's ability to store and transport carbon particularly by studying the ocean's biology and the climate feedback on ocean biology. Initiate experiments and ocean modeling with high resolution grids to explore processes such as those controlling the formation of deep water. ($3,000)
	$ 714	$ 3,000	$ 3,000
Quantitative Links	No activity.	Launch the Atmospheric Radiation Measurement (ARM) Program to validate the radiative codes used in climate models as well as improve the cloud-climate feedback parameterizations. Through an open solicitation create the science team to develop the research strategy and start instrument development activity. ($10,000)	Principal activity is the Atmopsheric Radiation Measurement (ARM) Program; this research involves the acquisition of high quality radiation measurements in the atmospheric column as well as the vertical profiles of the atmospheric characteristics responsible for the radiative balance. The objective is to improve the fundamental understanding of the cloud-climate feedback mechanism and to incorporate this improved understanding in the relevant parameterizations of the climate models. Specific tasks for this

III. Carbon Dioxide Research (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Quantitative Links (Cont'd)			fiscal year include the development of ground based remote sensing instrumentation, site selection and preparation of the first fixed ARM site. Also planned is participation in campaign studies associated with the First International Satellite Cloud Climatology Project Research Experiment (FIRE) field study primarily with instruments of the mobile ARM unit. ($17,000)
		Commence research activities to quantify the link between the rise of atmospheric greenhouse gases and climate change. ($3,000)	Support experimental studies to quantify the link between the rise of atmospheric greenhouse gases and climate change. Examples inlcude a sound propagation field program to identify an ocean warming signal and studies of stratospheric temperature measurements. ($4,000)
	$ 0	$ 13,000	$ 21,000
Vegetative Effects	Continued experiments and began agro-ecological systems modeling. ($3,787)	Continue experimental research and modeling to determine the simultaneous influence of CO2 and climate change on selected plants. Plan a large scale field study to control/manipulate ecological, atmospheric and other environmental conditions to provide validation information for ecological models. ($7,200)	Continue experimental research and modeling to determine the simultaneous influence of CO2 and climate change on selected plants, with emphasis on photosynthesis and growth in relation to variable CO2 and temperature. Launch a large scale field study to control/manipulate ecological, atmospheric and other environmental conditions to provide validation information for ecological models. Search for existing evidence of biological response to changes in atmospheric CO2 and climate of the past few decades. Explore approaches for enhancing plant productivity to accelerate CO2 removal from the atmosphere. ($7,200)

III. Carbon Dioxide Research (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Vegetative Effects (Cont'd)	$ 3,787	$ 7,200	$ 7,200
Resource Analysis and Education	Conducted analysis to investigate potential CO2 reductions through energy strategic planning. Identified regions in jeopardy and the potential effects on resources. ($1,200)	Conduct a study of the Midwestern United States to identify the methodology for identifying the resources in jeopardy from climate change. ($1,800)	A preliminary study of the Midwestern United States will demonstrate the methodology for identifying the resources in jeopardy from climate change. Expand the methodology for resource analysis to include China and Western Europe as well as additional regions in the USA. ($1,700) The DOE educational program on global change will emphasize interdisciplinary research at the graduate and postgraduate level and will promote operational experience in team research at national laboratories and other science and technology centers. ($4,000)
	$ 1,200	$ 1,800	$ 5,700
Information and Integration	Continued activities of the Carbon Dioxide Information and Analysis Center and expanded global networking. ($1,289)	Further develop the Carbon Dioxide Information and Analysis Center in order to meet the requirements of a World Data Center. Start newsletters on ARM and CHAMMP. Perform studies of the balance and scope of the climate change research program. ($1,846)	The Carbon Dioxide Information and Analysis Center will continue to compile, evaluate and distribute CO2-related information. The Center identifies research needs for data, models and information; obtains, evaluates and quality assures the data; and works with other national and international data centers to promote useful data exhanges. This fiscal year the Center will be fully developed to meet the additional requirements imposed by its pending membership as a World Data Center. The Center will continue to issue newsletters on ARM and CHAMMP. ($1,800)
	$ 1,289	$ 1,846	$ 1,800

III. Carbon Dioxide Research (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Carbon Dioxide Research	$ 17,369	$ 50,046	$ 65,900

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

I. Preface: Biological and Environmental Research Program Direction

This subprogram provides the Federal staffing resources and associated funding needed to plan, direct, manage, and support a comprehensive multidisciplinary research effort designed to understand the long-term health and environmental effects associated with the development and use of various energy technologies, and to utilize the Department's unique resources to solve major scientific problems in biology and medicine. This staff will help to meet national energy goals of promoting health and safety as well as a clean environment through management of basic research.

II. A. Summary Table: Biological and Environmental Research Program Direction

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Salaries and Expenses	$ 3,441	$ 4,281	$ 5,530	+ 29
Other	559	255	270	+ 6
Total, Biological and Environmental Research Program Direction	$ 4,000	$ 4,536	$ 5,800	+ 28

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Biological and Environmental Research Program Direction			
Salaries and Expenses	Provided funds for salaries, benefits, and travel for 54 full-time equivalents (FTE's) in the Office of Health and Environmental Research and related program and management support. Provided guidance and support for over 850 active research projects (reviewing and evaluating many hundreds more throughout the proposal selection process) and conducted major reviews of the numerous BER-sponsored programs at laboratories and universities. Addressed escalating environment, safety and health (ES&H) issues as they pertained to program facilities and was heavily involved in research on the human genome, radon and nuclear medicine as well as international collaboration on radiation biology programs. Increased staff effort on global warming, mixed waste remediation, and technology transfer issues. Maintained close liaison with other DOE programs, other Federal agencies, and the scientific, academic and industrial communities and provided the program and management support services required to carry out the program.	Provide funds for salaries, benefits, and travel for 55 FTE's included in the FY 1990 budget including normal increased personnel costs. A revised request for ten additional FTE's will provide enhanced management oversight of ES&H activities and for basic research in support of National goals to promote health and safety. Two of the additional FTE's will provide increased line management capability to ensure compliance with ES&H directives and regulations at numerous nonreactor research facilities. Appraise contractor ES&H performance and ensure safe disposal of spent fuels and other byproducts and wastes. Two additional FTE's are also required to enhance the Office of Energy Research's independent ES&H oversight capability to carry out responsibilities involving nuclear safety, health physics, occupational safety and industrial hygiene, environmental protection, hazardous waste management, safeguards and security, emergency preparedness, and quality assurance. Perform safety appraisals and environmental compliance audits. Six additional FTE's will provide technical expertise for the human genome program which is experiencing significant growth and which has been identified by several advisory groups as having major health and economic benefits; for expansion and increased emphasis nationally and internationally on global climate change and global warming; and for the Secretary's initiative for an expanded epidemiology program including	Provide funds for salaries, benefits and travel for 65 FTE's. The increased funding will provide for 10 additional FTE's above the FY 1990 budget level, as discussed in FY 1990, and for normal increased personnel costs resulting, for example, from within-grade and merit increases and the impact of the FY 1990 general and executive pay raises. In addition to enhanced ES&H line management and independent oversight, provide increased management capability for increased R&D and liaison activities in areas such as human genome, global warming, and epidemiology. The latter includes establishing a Comprehensive Epidemiological Data Repository for use by any qualified researcher. Staff will manage access to the data in the Repository as well as manage additional projects and studies. The global warming program requires additional effort to manage the significant expansion into untapped research communities, including critical atmospheric experiments, advanced computer networks, and understanding the processes of climate change and the carbon cycle. Contribute directly to the safety of DOE's operations and programs, and advance knowledge and instruments for application in the medical field. Continue to closely coordinate programs with other programs and agencies, nationally and internationally, to meet needs and avoid duplication. The research conducted in the Biological and Environmental Research program

III. Biological and Environmental Research Program Direction (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Salaries and Expenses (Cont'd)		establishment of a Comprehensive Epidemiological Data Repository and a new effort in offsite studies.	continues to support other DOE programs and development of sound energy policy and has significant human health benefits.
	$ 3,441	$ 4,281	$ 5,530
Other	Provided for a variety of program support such as printing and editing, supplies, services, materials, and contractual services, for example, to assist with ES&H workload required by current regulations and directives and time-sharing on various information systems and communication networks.	Continue the variety of program support required in FY 1989.	Continue the variety of program support required in FY 1990.
	$ 559	$ 255	$ 270
Biological and Environmental Research Program Direction	$ 4,000	$ 4,536	$ 5,800

DEPARTMENT OF ENERGY
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ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

I. Preface: Facilities Operations

Facility operations provide for the necessary capital equipment and general plant project needs to support the BER program and the Pacific Northwest Laboratory landlord responsibilities. An ability to address health and environmental issues requires a continuing commitment to maintaining advanced instrumentation and facilities.

II. A. Summary Table: Facilities Operations

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Capital Equipment	$ 8,985	$ 11,272	$ 11,621	+ 3
Construction	23,500	22,149	3,485	- 84
Total, Facilities Operations	$ 32,485	$ 33,421	$ 15,108	- 55

II. B. Major Laboratory and Facility Funding

Ames Laboratory	$ 65	$ 34	$ 35	+ 3
Argonne National Laboratory	$ 730	$ 621	$ 630	+ 1
Brookhaven National Laboratory	$ 1,093	$ 937	$ 950	+ 1
Environmental Measurements Laboratory	$ 380	$ 384	$ 390	+ 2
Inhalation Toxicology Research Institute	$ 1,155	$ 453	$ 1,145	+153
Laboratory of Radiobiology and Environmetal Health	$ 150	$ 148	$ 150	+ 1
Lawrence Berkeley National Laboratory	$ 1,305	$ 666	$ 800	+ 20
Los Alamos National Scientific Laboratory	$ 1,054	$ 1,030	$ 750	- 27
Oak Ridge Associated Universities	$ 300	$ 295	$ 300	+ 2
Oak Ridge National Laboratory	$ 1,175	$ 1,159	$ 1,175	+ 1
Pacific Northwest Laboratory	$ 3,255	$ 5,313	$ 5,350	+ 1
Savannah River Ecology Laboratory	$ 25	$ 24	$ 25	+ 4
Savannah River Laboratory	$ 20	$ 19	$ 20	+ 5
Lawrence Livermore National Laboratory	$ 850	$ 798	$ 800	0

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Facilities Operations			
Capital Equipment	Capital equipment budget was maintained at FY 1988 level with a minor adjustment for cost of living. ($8,965)	Maintain basic capital equipment budget at FY 1989 level with adjustment for cost of living. ($8,057) Provide advanced technologies for subsurface research program to design and instrument a prototype intermediate scale experimental system for integrated experiments in geochemistry/microbiology under conditions of simulated groundwater flow. No such capability exists nationally. ($1,775) Equipment funds are required for the carbon dioxide research program connection to the MFENET and for the special work stations required to support the advanced graphic display and analyses of the output of the General Circulation Models (GCMs) experiments, and for Geographic Information System (GIS) equipment for data digitizing and analysis. ($1,440)	Maintain capital equipment budget at approximately last years level, while providing for increased emphasis to needs of the human genome and carbon dioxide research.
	$ 8,965	$ 11,272	$ 11,621
Construction	The general plant project budget was maintained at the FY 1988 level. ($3,500) Funds were provided to support university construction projects. ($20,000)	Maintain general plant project budget at approximately FY 1989 level. ($2,429) Funds are provided to support university construction projects. ($19,720)	Maintain general plant project budget at last years level. ($3,485)
	$ 23,500	$ 22,149	$ 3,485
Facilities Operations	$ 32,465	$ 33,421	$ 15,106

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ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Biological and Environmental Research

IV. A. Construction Project Summary

Project No.	Project Title	Total Prior Year Obligations	FY 1990 Appropriation	FY 1991 Request	Unappropriated Balance	TEC
GPE-120	General Plant Projects	$ XXX	$ 2,429	$ 3,485	$ 0	$ XXX
-------	University Construction Projects	XXX	19,720	0	0	XXX
Total, Biological and Environmental Research Construction		$ XXX	$ 22,149	$ 3,485	$ 0	$ XXX

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ENERGY SUPPLY RESEARCH AND DEVELOPMENT
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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Biological and Environmental Research

IV. B. Plant Funded Construction Project

1. Project title and location: GPE-120 General Plant Projects

Project TEC: $ 3,485
Start Date: FY 1991
Completion Date: FY 1993

2. Financial schedule:

		Costs			
Fiscal Year	Obligations	FY 1989	FY 1990	FY 1991	After FY 1991
Prior Year Projects	XXXXXXX	$ 2,640	$ 1,485	$ 450	$ 485
FY 1989 Projects	$ 3,500	587	350	400	2,153
FY 1990 Projects	$ 2,429	0	700	450	1,279
FY 1991 Projects	$ 3,485	0	0	700	2,785

3. Narrative:

This estimate is for minor new construction and other capital alterations to land, buildings, and utilities systems. The estimate also includes the cost of installed equipment which is an integral part of the general plant subprojects.

General plant projects are necessary to maintain facilities in an environmentally safe and health hazard free condition. They are also required to keep facilities in adequate repair, including roads, parking lots, pavements, etc. The OER program supports such needs as a landlord responsibility for the Pacific Northwest Laboratory and for other laboratories and universities.

4. Total Project Funding (BA)	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	XXX	$3,500	$2,429	$3,485	XXX

VOLUME 2

MAGNETIC FUSION

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH

OVERVIEW

MAGNETIC FUSION ENERGY

Fusion is the process by which the sun and other stars produce energy. The task of the Magnetic Fusion Energy program has been to develop theory and conduct experiments to determine how fusion reactions can be controlled and used to produce energy. While this has proven to be a very difficult task, substantial technical progress has been made in both the U.S. and throughout the world.

A 1989 National Academy of Science study concluded, "A prudent long-term energy strategy for the United States requires that alternative electric energy supply technologies be researched, developed, and demonstrated. A diversified array of alternatives is needed as insurance against the vulnerability of existing alternatives such as coal and nuclear fission".

At this point in its development, there appear to be a number of potential advantages to fusion. First, the fuel is inexpensive and easily obtained. Second, it has the potential to provide energy with minimum impact on the environment and to substantially reduce or eliminate any high-level long term radioactive waste problem. Third, the amount of fuel contained in a fusion reactor would be relatively small, thus enhancing the safety attractiveness of fusion. The fuel cycle for fusion is simpler than for fission and no fissile materials are produced that could be diverted to the production of nuclear weapons. Finally, while cost estimates for the production of fusion power must be based on a number of assumptions, economics of the fusion option appear to be acceptable compared to the alternative sources.

The path to the successful development of magnetic fusion energy requires the achievement of significant energy gain within the reacting plasma and development of the necessary technology. The program is currently trying to enhance its understanding of energy confinement in order to clarify the requirements for significant energy gain. In addition, science and technology research and development is required to assess the potential economics of fusion. Finally, an integrated world-wide program is appropriate to establish the science and technology base for fusion and create opportunities for the U.S. to benefit from collaboration on major facilities such as the proposed International Thermonuclear Experimental Reactor (ITER).

The science of fusion, plasma physics, is complex and rich in non-linear phenomena. The technology is challenging, pushing the state-of-the-art in a number of areas. In spite of the difficulties of achieving the magnetic fusion goal, significant progress has been made. This progress has yielded a solid basis for understanding the behavior of a plasma. This understanding has led to broad consensus on how magnetic confinement of fusion plasma is to be achieved. To date, the most effective way to confine the plasma is in a toroidal or doughnut shaped device. The leading toroidal confinement concept is the tokamak. The tokamak uses a toroidal magnetic field and an internal plasma current to confine the plasma. Tokamak performance has improved more than seven orders of magnitude over the past 20 years. Based on recent results from the Tokamak Fusion Test Reactor (TFTR) and Doublet III-D (both in the U.S.) and Joint European Tokamak (JET; in the EC), fusion continues to look promising.

The program is organized around four key technical issues. The first is understanding how the plasma behaves once fusion reactions are producing sufficient heat to maintain reacting or burning conditions. The second is determining the best confinement configuration by studying potentially improved devices or fuels. The third issue involves research on materials to see which ones provide the best safety margin and the lowest levels of induced radioactivity when introduced to a fusion reactor environment. The fourth issue requires the development of the nuclear technology to effectively and safely convert fusion energy to electricity. The emphasis in the program is currently on the first two issues. The technology elements are a modest portion of the program with ITER providing a valuable current focus and an essential future test environment.

The program is presently focussing on developing a predictive understanding of the mechanisms governing confinement of energy within the tokamak. Experimental data suggests improved confinement will be required for the next generation of devices. This improved confinement has now been observed in a number of tokamaks. The program is working on developing the understanding necessary to apply these observed improvements to future devices. Once the necessary degree of confidence is obtained, the next major step will be to explore the regime of self-heated, sustained plasmas.

The Magnetic Fusion Energy budget is organized into 5 major categories; Confinement Systems, Applied Plasma Physics, Development & Technology, Planning & Projects, and Program Direction.

The first budget category, Confinement Systems, provides the support necessary to operate the larger experimental devices and to analyze the data in order to improve our understanding of plasma behavior and to learn how to obtain and control the physical conditions necessary for the production of fusion energy.

The Tokamak Fusion Test Reactor, at the Princeton Plasma Physics Laboratory (PPPL), is the largest U.S. tokamak with a long term objective of operation using deuterium-tritium fuel at reactor-relevant plasma densities and temperatures. The Princeton Beta Experiment-M at PPPL is a highly shaped tokamak with a major focus on attaining higher plasma pressure operation. The Alcator C-Mod is under construction at the

Massachusetts Institute of Technology (MIT) and will begin operation in 1991 to study plasma performance with a compact high field, high-density design using improved plasma edge controls. The Advanced Toroidal Facility at Oak Ridge National Laboratory (ORNL) is a flexible stellarator which will contribute to the understanding of toroidal confinement. Doublet III-D, operated by General Atomics is the second largest tokamak in the U.S. and is the focal point for a variety of experiments on plasma transport. The Microwave Tokamak Experiment at the Lawrence Livermore National Laboratory (LLNL) is a compact, high field tokamak and will be used to test an advanced heating source of high frequency waves produced by a powerful free electron laser. Support for international collaborative efforts on foreign tokamaks, with unique features not available in the U.S., is also provided. Finally, R&D, prototype, and development and design support is provided for the Compact Ignition Tokamak. The objective of this device will be to study the physics of a self-heated plasma.

The second category, Applied Plasma Physics, provides for the study of potentially attractive advanced confinement configurations, as well as the physics and computing support for the rest of the program. Two advanced configurations being studied, because of their potential for more efficient use of magnetic fields than tokamaks, are the Reversed Field Pinch (RFP) and the Compact Toroids. The Confinement Physics Research Facility is under construction at Los Alamos National Laboratory (LANL) to improve our understanding of RFP's. For Compact Toroids, the Field Reversed Experiment-C (FRX-C) device at LANL is operated and construction of the Field Reversed Configuration Physics Experiment facility will be completed at Spectra Technologies in FY 1990. There are also several smaller university experiments in this area. Physics support includes the conduct of the more basic physics studies to understand the fundamentals of plasma behavior and to develop innovative plasma control techniques and to interpret experimental results from the major experiments. Activities include development of diagnostics for transport studies on the TEXT tokamaks and theory support to provide a predictive understanding of plasma behavior. The final element of the Applied Plasma Physics category is computing support. In cooperation with all Energy Research programs, advanced computing capability is provided for theoretical predictions, interpretation of the experiments, and design of experimental devices.

The third category, Development and Technology, provides support for development of plasma and fusion technologies and systems design work necessary to provide the technology needed for the fusion program to advance. Support of design and validating R&D of an International Thermonuclear Experimental Reactor is also provided in these areas. In plasma technology, large high field steady-state pulsed magnets are developed. In addition, plasma heating and fueling technologies are developed. In fusion technology, low activation and radiation resistant structural materials are developed that have acceptable characteristics for the fusion reaction environment. Also included is development of materials that can resist high heat flux and plasma erosion and fusion nuclear components to produce and process tritium and convert fusion energy into useful forms. The systems design work is targeted at developing improved reactor designs and performing the International Thermonuclear Engineering Reactor design.

The fourth category, Planning and Projects, provides support of major construction projects and miscellaneous items such as the Small Business Innovative Research (SBIR) program and landlord responsibilities at ORNL.

The fifth category, Program Direction, provides for the costs associated with carrying out the management responsibilities of the Magnetic Fusion Energy program.

An independent high level policy review of fusion is scheduled to be conducted in FY 1990. The FY 1991 budget request for Magnetic Fusion Energy provides funding which does not in any way presume the eventual conclusions of the review. This budget provides for continuing the program as much as possible as it was in FY 1989 and FY 1990 with a focus on confinement physics. Although there are some reductions, there will be no major changes in the program balance until the Secretary's review of the program is completed. Once it is completed, budget estimates will be revised as necessary. The allocation depicted in this budget document is not intended to signal any change in policy regarding fusion.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH
(dollars in thousands)

LEAD TABLE

Magnetic Fusion Energy

Activity	FY 1989 Actual	FY 1990 Estimate	FY 1990 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
Operating Expenses						
Confinement Systems	$172,650	$160,170	$160,170	$163,050	$+ 2,880	+ 2
Applied Plasma Physics	81,155	71,609	71,609	70,880	- 729	- 1
Development and Technology	54,145	47,419	47,419	48,060	+ 641	+ 1
Planning and Projects	1,122	4,206	4,206	4,250	+ 44	+ 1
Program Direction	4,600	4,930	4,930	5,650	+ 720	+15
Subtotal Operating Expenses	313,672	288,334	288,334	291,890	+ 3,556	+ 1
Capital Equipment	18,835	13,330	13,330	14,310	+ 980	+ 7
Construction	12,152	18,595	18,595	19,100	+ 505	+ 3
Total	344,659 a/b/	320,259 b/c/	320,259 b/c/	325,300 b/	$+ 5,041	+ 2
Operating Expenses	(313,672)	(288,334)	(288,334)	(291,890)	+ 3,556	+ 1
Capital Equipment	(18,835)	(13,330)	(13,330)	(14,310)	+ 980	+ 7
Construction	(12,152)	(18,595)	(18,595)	(19,100)	+ 505	+ 3
Staffing (FTEs)	60	64	64	64		

Authorization: Section 209, P.L. 95-91

a/ Total has been reduced by $3,877,500 which has been transferred to the SBIR program.
b/ $2,152,000 in FY 1989, $2,759,000 in FY 1990, and $3,287,000 in FY 1991 has been transferred to the Environmental Restoration/Waste Management Program.
c/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Magnetic Fusion Energy

FY 1990 Appropriation	$ 320,259
Adjustments	--
FY 1991 Base	$ 320,259
Magnetic Fusion Energy Program	+ 5,041

- This represents an increase of about 2% and provides for continuing the program as much as possible as it was in FY 1989 and FY 1990 with a focus on confinement physics. Although there are some reductions in the level of effort there will be no major changes in the program balance, and international commitments will be honored, for the most part until the Secretary's review of the program is completed. Once it is completed, budget estimates will be revised as necessary. The allocation depecited in this budget document is not intended to signal any change in policy regarding fusion.

FY 1991 Congressional Budget Request	$ 325,300

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

MAGNETIC FUSION ENERGY

I. Preface: Confinement Systems

The Confinement Systems subprogram addresses two of the four key technical issues for magnetic fusion - improving magnetic confinement systems and understanding the properties of burning plasmas. These issues are investigated through experimental research on controlling and heating the plasmas required for a magnetic fusion energy source. This research is conducted primarily on toroidal configurations, which have been proven most effective in providing the necessary plasma parameters. This research involves developing the data base needed to understand the behavior of a burning plasma and to identify an optimum confinement system. The approach is to use theory, modeling, and previous experimental results to determine how to extend the present data base using existing devices and to design and fabricate new devices when additional information is needed to complete the data base. The primary scientific issues being addressed by this research are energy confinement, heating, plasma stability, current drive, edge physics, and particle control. Energy confinement is a major critical issue affecting the size and cost of any future fusion device. In a reactor, the plasma must be heated to a high temperature to initiate the fusion reaction, and, at this high temperature, the plasma thermal energy must be sufficiently well contained that the heating power from the fusion reactions sustains the plasma. The research on this topic involves using and understanding auxiliary heating methods, such as neutral beam heating and radiofrequency (rf) wave heating, to heat a plasma to high temperatures and then using sophisticated diagnostics to characterize, understand, and reduce energy transport in a high temperature plasma. A major redirection of the Confinement Systems program in FY 1989 focused resources on the topic of energy confinement. This concentration on confinement will continue in FY 1990 and FY 1991. This work is carried out in close cooperation with experimental groups and theory groups in the Applied Plasma Physics subprogram.

In a practical fusion power reactor, the temperature and density of the plasma (the plasma pressure) must be quite large. The ratio of plasma pressure to the confining magnetic field pressure is referred to as beta. Since achievable magnetic fields are limited, research on plasma stability concentrates on alternate plasma shapes and operating modes that theory predicts can maximize the plasma pressure supported for a given magnetic field. This work includes attempts at obtaining a predicted second regime of stability with even higher beta.

The current drive issue addresses operation of devices in a steady state mode as opposed to a pulsed mode. The primary advantage of steady state operation in a reactor is that it will reduce component fatigue problems. Planned experiments will attempt to drive continuous currents in tokamaks with radio- frequency heating.

The final technical issue is edge physics and particle control. Impurities can dilute the deuterium/tritium fuel, cool the plasma, and/or cause the plasma to contract and become unstable. Thus, impurities must be controlled throughout the period of operation. A major source of these impurities is particles dislodged from the vessel walls due to chemical and physical erosion. Studies are being conducted to ensure that the plasma is kept as clean as possible by reducing the generation of impurities and by isolating the impurities that are generated. Another particle control issue concerns methods of fueling to replenish the fuel ions. Current experiments are testing fueling by injection of frozen pellets. Finally, it is now recognized that edge physics and particle control can have a significant effect on the energy confinement time.

Research is being conducted on several toroidal devices to investigate the above mentioned physics issues and to prepare for performing the burning plasma physics experiments on the Compact Ignition Tokamak (CIT). The confinement of high temperature plasmas will be studied in the

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I. Confinement Systems (Cont'd)

TFTR device at Princeton Plasma Physics Laboratory (PPPL). Experiments on the confinement, beta, and current drive issues will be carried out on the Doublet-III-D device at General Atomics (GA). The objective of the Alcator C-Modification facility at the Massachusetts Institute of Technology (MIT) is to study rf heating energy confinement, and current ramp-up in a high field, high density plasma. The former Alcator-C tokamak has been moved to Lawrence Livermore National Laboratory (LLNL) and renamed the Microwave Tokamak Experiment (MTX). This provides LLNL with the unique target plasma capability to conduct initial experiment on the applicapability of pulsed high power microwaves as a heating technique in tokamak devices. International collaboration will be relied on to carry out research on a number of related plasma issues in foreign facilities including TEXTOR and ASDEX in West Germany, TORE SUPRA in France, Joint European Torus (JET) in England, and JFT-2M and JT-60 in Japan.

A concentrated U.S. analysis effort has been underway to establish the physics basis for achieving ignition and burn using the experimental data base from these U.S. and foreign experiments. Achievement of ignition has always been an essential objective of magnetic fusion research. The successful operation of an ignition divice like the Compact Ignition Tokamak (CIT) would demonstrate the fundamental feasibility of magnetic fusion, provide key support to the initiative to conduct a joint International Thermonuclear Experimental Reactor (ITER) program, and maintain the scientific progress in the U.S. fusion program. This budget continues the design effort to build such an ignition device to replace TFTR. It is the essential next step in the U.S. Fusion Program.

Work on identifying an optimum toroidal confinement system will be continued. The Princeton Beta Experiment (PBX-M) device at PPPL will resume its program of confinement and beta research with new hardware to provide pressure profile and current profile control. The Advanced Toroidal Facility (ATF) will continue study of confinement on beta in a configuration with helical field coils and no plasma current.

Upgrades and modifications to existing devices are accomplished by major device fabrication (MDF) projects. These projects increase the inherent capability of the devices in a cost effective way as progress is made towards understanding the relevant physics issues. The only remaining MDF project, the Alcator C-MOD at MIT, will be completed in FY 1991. Activities in the mirror program will be terminated in FY 1990 as close-out costs on MFTF-B are completed. The following table summarizes the operating expense funding for the Confinement Systems subprogram:

II. A. Summary Table: Confinement Systems

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Tokamak Fusion Test Reactor	$ 66,634	$ 60,465	$ 57,850	- 4
Base Toroidal	60,802	59,800	64,810	+ 8
Advanced Toroidal	22,998	16,695	23,250	+ 39
Major Device Fabrication	4,900	3,410	390	- 88
Compact Ignition Tokamak	14,967	17,300	16,750	- 3
Tandem Mirror Operations	2,349	2,500	0	-100
Total, Confinement Systems	$ 172,650	$ 160,170	$ 163,050	+ 2

II. B. Major Laboratory and Facility Funding

General Atomics	$ 31,720	$ 30,422	$ 29,950	- 2
Lawrence Livermore National Laboratory	$ 15,720	$ 13,677	$ 10,800	- 21
Massachusetts Institute of Technology	$ 16,372	$ 16,191	$ 17,026	+ 5
Oak Ridge National Laboratory	$ 19,134	$ 17,426	$ 18,019	+ 3
Princeton Plasma Physics Laboratory	$ 84,873	$ 77,697	$ 80,504	+ 4

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Confinement Systems			
Tokamak Fusion Test Reactor	Following a redirection of the TFTR program early in the year, TFTR began a 3-year program to study the physics of plasma transport at reactor-like plasma parameters. In particular, TFTR attempted to establish the physics basis of peaked density profiles for a more attractive reactor concept. The D-T experiments were delayed 3 years.	An initial set of transport diagnostics will be added to characterize local transport, compare the transport with fluctuations, and compare the measured transport and fluctuations with various theories. Neutral beam and ICRF heating systems will be used at their full power capability of 30MW and 7MW respectively to optimize plasma performance and prepare for equivalent breakeven experiments in deuterium. The graphite limiter will be up-graded with carbon-carbon composite tiles, which can handle higher heat loads. Work will begin on an additions to the ICRF heating system.	A second set of transport diagnostics will be used to complete the transport studies and to demonstrate improved understanding of transport in deuterium plasmas. Work will continue on increasing the ICRF system power from 7 to 10 MW. The rf limiters will be upgraded so that they can handle more power. Finally, D-T preparation activities will be continued at a low level.
	$ 66,634	$ 60,465	$ 57,850
Base Toroidal	Carried out experiments on DIII-D to gain a detailed understanding of energy confinement time and beta as functions of plasma shape, current profile, and edge plasma conditions in both diverted and limiter discharges with an emphasis on pressure and current profile control with RF, neutral beam injection. Began implementation of 2MW 110GHz electron cyclotron heating systems and an Advanced Divertor Program to aid these experiments. Enhanced diagnostics capabilities for transport studies.	D-III-D continues energy confinement and high beta programs with optimized profile/ shape control. Initiate fast wave current drive Ion Cyclotron Radio Frequency experiments. Begin installation of 110GHz ECH system, fast wave current drive system and the advanced divertor baffle system for density control and edge modification.	D-III-D continues energy confinement and high beta program and begins divertor pumping and biasing experiments; complete installation of 2MW 110GHz ECH and evaluate initial results on fast wave current drive. Test non-inductive current drive at moderate beta.

III. Confinement Systems (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Base Toroidal (Cont'd)	Initiated installation of major components, diagnostic upgrades, and data acquisition systems to support initial operation of Alcator C-MOD in 1991. Continued development of advanced diagnostics, ECH, and advanced operating modes for C-MOD.	Continue installation of the major components, diagnostics, data acquisition systems, and control systems of Alcator C-MOD.	Finish installation of major components and begin operation of Alcator C-Mod, a high field, shaped, and diverted tokamak. Conduct experiments with ohmic and pellet fueled plasmas. Begin ICRF heating experiments at the 2MW level and finish ICRF installation required to achieve 4MW in 1992. Continue development of advanced diagnostics, and advanced toroidal modes of operation for C-MOD.
	Began initial ohmic operation of MTX and relate it to previous Alcator C operation. Initiated single pulse 140GHz Free Electron Laser (FEL) pulses into the plasma.	Install a pellet injector and a 140 GHz gyrotron for ECH heating studies of high density plasmas. Begin installation of a new wiggler in the FEL for burst mode operation.	Begin burst mode operation of the FEL using the new wiggler and conduct experiments on microwave absorption, heating, and confinement in high density plasmas.
	The Japanese collaborated on MTX by providing diagnostics and visiting scientists.	Continue collaboration with Japan on MTX.	Continue collaboration with Japan on MTX.
	Under collaborative programs with the several European countries, the DOE (1) continued the edge physics and particle control experiments on TEXTOR jointly with West Germany and Japan; (2) Completed hardware fabrication and prepare for experiments on particle control, pellet fueling, and ICRF heating, pending repair of Tore Supra coil; (3) Continued pellet fueling experiments on JET; and (4) Continued a collaborative research program on poloidal divertor and confinement experiments of ASDEX.	Using international collaboration, continue joint experiments on fueling, edge physics and particle control, heating, and energy confinement on TEXTOR, ASDEX, JET, and Tore Supra, and JFT-2M; Complete LH current drive experiments in ASDEX and initiate experiments on ASDEX-Upgrade; take part in high speed pellet fueling experiments on JET and participate in size scaling and divertor pumping experiments on JET. Complete divertor biasing experiments on JFT-2M.	Continue collaborative experiments on edge physics, particle control, fueling, heating, current drive, and confinement experiments on TEXTOR, ASDEX-U, JET, and Tore Supra.
	$ 60,802	$ 59,800	$ 64,810

III. Confinement Systems (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Advanced Toroidal	Investigation of high beta (second stability regime), transport, and plasma material interactions and particle control continued. Pellet fueling studies, an assessment of different methods of impurity control on ATF, and stellarator configuration studies were made.	Continue investigation of confinement characterization and improvement - low collisionality transport (bootstrap current and trapped electron modes) and edge fluctuation induced transport.	With additional heating power, diagnostics, and field error control, investigations of fluctuation induced transport, low collisionality transport, high beta and particle control will be conducted at ATF.
	PBX-M began using ion bernstein wave (IBW) heating and lower hybrid (LH) current drive in their efforts to increase beta.	The PBX-M experimental operation will be halted for the year PBX-M will have 2MW lower hybrid current drive and 3MW ion bernstein wave heating equipment installed to produce highly indented high beta plasmas.	Experimental program will resume employing lower hybrid current drive and ion bernstein wave heating to investigate high beta 2nd stability; transport studies and divertor operation will be conducted using unique plasma shaping capability of PBX-M.
	$ 22,998	$ 16,695	$ 23,250
Major Device Fabrication	Finished fabrication and began installation of Alcator C-MOD at MIT.	Installation of all major systems for Alcator C-MOD at MIT is finished.	Final testing of all major systems of Alcator C-Mod will be carried out and initial operation will begin in mid FY 1991.
	$ 4,900	$ 3,410	$ 390
Compact Ignition Tokamak	Continued design optimization of CIT tokamak and accomplished technology R&D related to the magnetic coil systems.	Continue preliminary design and produce detailed designs and manufacturing procedures for major prototypes. Contract placement activities will be initiated for fabrication of prototype components in FY 1991 or subsequent years.	Continue preliminary design to improve device performance and conduce technology R&D in support of prototypes.
	$ 14,967	$ 17,300	$ 16,750

III. Confinement Systems (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Tandem Mirror Operations	Continued close-out of MFTF-B contracts and maintained the system components for other uses in a safe and secure way.	The mirror program will be completed with the final close-out of MFTF-B.	
	$ 2,349	$ 2,500	$ 0
Confinement Systems	$ 172,650	$ 160,170	$ 183,050

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

MAGNETIC FUSION ENERGY

I. Preface: Applied Plasma Physics

The Applied Plasma Physics subprogram develops physics understanding and innovative techniques to allow for improved confinement concepts and achievement of program goals in ignition and reactor design. Applied Plasma Physics conducts research on basic magnetic confinement physics, including non-tokamak configurations, and supports and supplements research performed in the Confinement Systems subprogram by developing and implementing new diagnostics and by developing plasma heating and control concepts and basic data necessary to design and conduct larger scale fusion experiments. Activities include: theoretical and experimental physics support, research on advanced fusion concepts, and large-scale computing.

In Advanced Fusion Concepts, the scientific understanding of magnetically confined plasmas is being pursued through experiments with varying magnetic configurations. The technical objective is to conduct experimental tests of critical physics issues on potentially attractive reactor concepts that are alternatives to tokamaks and to understand fundamental plasma behavior so that reactor relevant improvements are possible in any magnetic configuration. Configurations currently being evaluated are categorized by the names Reversed Field Pinch (RFPs), Field Reversed Configurations (FRCs), and Spheromaks. These configurations offer particular technological advantages in reactor embodiments. They all offer high beta plasmas, that is, high power density within the plasma, and consequent efficient use of the applied magnetic fields. RFP's should not require auxiliary heating. FRC's and spheromaks have simple magnet systems but different stability properties. Each of these configurations provide a different physical environment in which magnetically confined plasma obeys the same overall physical laws governing plasma stability and transport of energy and particles within the plasma. Thus the study of these different configurations provides unique insights valuable to the understanding and mathematical approximation of physical laws governing the behavior of all magnetically confined plasma. During FY 1991 a new FRC device called LSX will be operated to test specific stability questions at Spectra Technologies, Inc. in Seattle, with university and international participation. Reversed field pinch development will be supported by experiments at the University of Wisconsin and at LANL with participation in start up of the RFX device in Italy and preparations for the new ZT-H device at LANL.

Plasma processes that determine the success of magnetic confinement are complex. The Fusion Plasma Theory and Experimental Plasma Research branches supply basic tools for understanding these plasma processes and in FY 1991 emphasis will be continued on applying these tools to current tokamaks.

Theory is responsible for the development of concepts and models that describe and predict the behavior of magnetically confined plasma. In FY 1991 specific emphasis will be given to modelling and understanding of processes controlling transport of energy and particles in toroidal plasma. Activities will also include modelling to predict and interpret plasma heating by ion cylotron waves (ICRF), electron cyclotron waves (ECH) and fast alpha particles generated by fusion reactions. In addition, general models of plasma behavior will be developed from physics features common to different confinement geometries. Predictive capability will be developed for parameter ranges not yet explored. This work uses both analytical and numerical techniques and is located at universities, national laboratories and industrial contractors.

The Experimental Plasma Research activity provides experimental techniques, basic data, and fundamental physics information required to operate and interpret present major confinement experiments. In FY 1991, at selected tokamaks, recently installed diagnostics will be applied that can

I. Applied Plasma Physics (Cont'd)

measure properties associated with energy and particle transport. Also, new diagnostic techniques required for measuring plasma properties will be developed and tested. The TEXT tokamak at University of Texas, Austin will be operated with new electron cyclotron heating and divertors in order to compare transport of particles and energy in various tokamak operation modes. Atomic data necessary for understanding plasma behavior will be obtained and compiled. New ideas currently receiving first tests are directed toward improved heating and current drive, better particle and energy control, and plasma stability at higher betas. Most of this work is at universities, with some national laboratories and industrial activity as well.

The Energy Sciences computing network provides access to state-of-the-art computational hardware (CRAY 1 and CRAY 2 computers). The network facilities provide support for the development of models and codes of plasma theory, for management and interpretation of experimental results, and for design of large scale fusion experiments. The network consists of the computers at LLNL and five user service centers at LLNL, LANL, General Atomics, PPPL, and ORNL, together with international data links and telephone line access by smaller users. In FY 1991 computer capability will be improved with faster network access between major sites and the computer center and by adding local computing work stations that can manipulate output from the cray computers as well as carry out extended calculations locally. The following table summarizes the operating funding for the Applied Plasma Physics subprogram.

II. A. Summary Table: Applied Plasma Physics

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Advanced Fusion Concepts	$ 21,618	$ 12,140	$ 12,000	- 1
Fusion Plasma Theory	20,520	19,412	19,600	+ 1
Experimental Plasma Research	20,890	24,677	23,680	- 4
MFE Computing	18,127	15,380	15,600	+ 1
Total, Applied Plasma Physics	$ 81,155	$ 71,609	$ 70,880	- 1

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Applied Plasma Physics			
Advanced Fusion Concepts	Continued the Confinement Physics Research Facility (CPRF) MDF project. About 50% of the funding has been committed.	Continue support of the CPRF construction project under the construction account including development of research diagnostics.	Continue support of the CPRF construction project under the construction account including development of research diagnostics.
	Operated Madison Symmetric Tokamak to understand confinement.	Use new equilibrium control on MST, and improve confinement.	Employ improved diagnostics on MST and correlate fluctuations with RFP confinement. Optimize density for improved confinement.
	Delayed LSX MDF project at Spectra Technology by 8 months. Revised cost and schedule completed. Project is on schedule (revised).	Complete LSX MFD in July.	Operate LSX to test stability theory.
	Modified Maryland Spheromak to increase temperature as part of the energy confinement study. Continue heating of LANL FRC device, and studied transport. Use ZT-40 program at LANL to prepare for RFP experiments.	Continue Maryland Spheromak heating experiments. Obtain record high temperatures in FRC at LANL. Study compression heating and transport.	Conduct high power rf heating experiments of Spheromak at the University of California at Berkeley. Conduct high field ohmic heating of Spheromak at the University of Maryland.
		Support LSX diagnostic development at universities.	Studies of rotation or the internal tilt mode will be carried out. Enhancement of formation time will be demined.
	$ 21,618	$ 12,140	$ 12,000
Fusion Plasma Theory	Continued to apply theory to understand plasma confinement experiments.	Continue to emphasize theory that seeks understanding of transport processes controlling plasma confinement.	Increase emphasis on developing improved understanding of transport and confinement in toroidal devices. Develop new techniques for experimental data evaluation and analysis.

III. Applied Plasma Physics (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Fusion Plasma Theory (Cont'd)	Continued theory on ignition physics, both by providing increased theory support for confinement experiments that are directly related to CIT and by developing new codes and models. Expanded efforts in alpha-particle theory and studies of transport and support for diagnostics in these areas.	Continue theory related to CIT with emphasis on plasma heating by RF waves (ICRF and ECH) and by fast alphas generated within reacting plasma.	Continue theory development in support of CIT and ITER. Special emphasis will be placed on resistive MHD (current ramp-up), RF heating (ECH and ICRF), alpha particle theory, and modeling of alpha particle detection techniques.
	Continued to carry out theoretical analysis of alternate concept experiments.	Provide predictions of behavior for new FRC plasmas and refine RFP theory to support Wisconsin experiment and future RFP device at LANL.	Emphasize theories and models for advanced toroidal concepts including non-inductive current drive, auxiliary heating, particle control and edge effects. Continue theoretical analysis of transport and confinement properties of alternate concept devices and apply insights gained from alternate concept theory to tokamak devices.
	$ 20,520	$ 19,412	$ 19,600
Experimental Plasma Research	Conducted tests of innovative current drive schemes. Continued basic experiments on high frequency RF effects in plasma.	Evaluate experiments on helicity injection current drive. Develop concepts for current profile control in tokamaks.	Evaluate effects of increased current on helicity injection experiments in low aspect ratio system. Investigate physics of compact toroid injection into medium sized tokamak.
	Increased operating time and heating capability of TEXT to extend results of earlier experiments to higher temperature plasmas. Constructed new coils and vacuum chamber for TEXT to study edge configuration effects on transport.	Install new coils, vacuum chamber, additional diagnostics, and additional ECH power at TEXT and initiate transport studies with various edge configurations.	Study correlation between edge electric field, fluctuations and transitions between various confinement modes using beam probe and related diagnostics on TEXT.
	Tested alpha diagnostic approaches.	Develop proof-of-principle alpha diagnostic for installation on major tokamak.	Install proof-of-principle alpha particle diagnostic system on a major machine for evaluation.

III. Applied Plasma Physics (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Experimental Plasma Research (Cont'd)	Conducted basic physics experiments in small stellarators and tokamaks with emphasis on plasma wave coupling to assist design of RF heating for major experiments.	Continue basic physic experiments in small stellarators and tokamaks with emphasis on understanding confinement.	Continue basic physic experiments in small stellarators and tokamaks with emphasis on understanding confinement.
	Installed and applied diagnostic devices to measure transport-related properties at major tokamaks.	Study effect of fluctuations on transport in major tokamaks. Develop combined spectroscopy with neutral beam for transport diangostics.	Carry out edge physics and fluctuation measurements related to transport on major tokamaks.
	Began publication of recommended atomic data for fusion in international collaboration through IAEA.	Compile and recommend atomic data for application to plasma edge issues with IAEA.	Begin excitation measurements for multiply charged ions using energy loss system. Continue electron-ion collision studies.
	$ 20,890	$ 24,677	$ 23,680
MFE Computing	Continued supporting large-scale computing and data analysis for the fusion program, through operation of the MFE network. Provided funds to initiate an upgrade of the User Service Center at General Atomics to improve support of DIII-D experiment. Continued supporting large-scale computing and data analysis for the fusion program, through operation of the MFE network. Provided funds to initiate an upgrade of the User Service Center at General Atomics to improve support of DIII-D experiment.	Participate with Energy Sciences Advanced Computation in operation of MFE Computer Center which operates two Cray 2's and one Cray XM-P 22 as well as the nationwide ESNET computer network, providing access to supercomputers and facilities at fusion laboratories. In addition, this activity provides partial support for local computing at major fusion sites. Begin installing local computing and upgrade network.	In cooperation with ESAC program operate the National MFE Computer Center with one Cray X-MP, one Cray 2, and one Class VII computer. Release newest Cray 2 at beginning of fiscal year but retain Serial 1 Cray 2 with smaller memory. Participate in Energy Sciences Network for connectivity to MFECC from other fusion sites and local computing work stations.
		Implementation plans for the Energy Sciences Network project, identified in the Applied Mathematical Sciences subprogram of the Basic Energy Sciences program, will proceed. The Magnetic Fusion Energy programs share for the implementation of ESNET is $493,000.	Upgrades of ESNET to conform to the national research and education network standards will continue to be pursued and will be shared among ER programs that benefit from ESNET.
	$ 18,127	$ 15,380	$ 15,600

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III. Applied Plasma Physics (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Applied Plasma Physics	$ 81,155	$ 71,609	$ 70,880

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

MAGNETIC FUSION ENERGY

I. Preface: Development and Technology

The Development and Technology subprogram provides for the development of the technologies needed for present and future fusion experiments and for design and analysis of fusion systems. The work is divided into three main areas: Plasma Technologies, Fusion Technologies, and Fusion Systems Analysis.

The Plasma Technologies activity develops the technologies needed to form, contain, heat and sustain a reacting fusion plasma. These technologies include magnetic systems, plasma heating systems, and plasma fueling systems. The principal activity in the magnetic systems program is to develop reliable high field pulsed and steady state superconducting magnets that provide the magnetic field conditions required to confine the plasma. The heating program focuses on developing the technologies required to heat the plasma ions and electrons to reactive conditions and to sustain a steady state plasma current needed for long term confinement of the plasma. It encompasses negative ion neutral beams and the electromagnetic wave heating approaches using electron cyclotron heating (ECH) and ion cyclotron resonance frequency (ICRF) techniques. The plasma fueling program develops high speed deuterium and tritium pellet injectors to not only maintain the proper amount of plasma fuel, but to tailor the plasma density profiles for optimum performances. Use of the developed heating and fueling systems directly supports the key technical issues of improving magnetic confinement and burning plasma systems and has enabled the production of record plasma conditions in fusion devices. This U.S. technology is in high demand internationally and provides the basis for many existing and future international collaborative programs. Projected experiments in higher density and higher temperature plasmas will necessitate continued development of higher power, longer pulse length, and higher frequency electromagnetic wave sources, transmission components, and improved fueling devices. The ITER magnets require a significant development and demonstration of the technology of very large, high field superconducting magnets.

The Fusion Technologies activity focuses on elements of fusion devices related to long term waste issues, safety features, environmental considerations, device reliability, tritium breeding, processing and retention, and power extraction. These elements are important for both the future fusion power reactors and for the ongoing fusion experiments. The tasks that address these elements are blanket and nuclear data, materials irradiation, plasma material interaction, and environment and safety. Ongoing tasks under blankets and nuclear data includes examination of different blankets designs for ITER, and cooperative IEA and US/Japan work on blanket engineering and Tritium Systems Test Assembly (TSTA) experimental tritium processing research. Materials irradiation supports examinations of ITER structural materials and divertor materials. In addition, there is an ongoing search for better future fusion structural materials in cooperation with Japan. Under Plasma Materials Interaction (PMI), research is ongoing for materials that provide the capability to withstand higher heat flux and plasma erosion for the first wall and divertor. PMI research focuses on examining erosion and redeposition on present tokamaks, as well as tritium retention and bake out. Environment and safety is concerned with the coupling of all the components in a safe and environmentally acceptable way. Emphasis today is being placed on studying the hazards associated with fusion radioactive products.

Fusion Systems Analysis conducts studies using analytical and computational tools as well as data from the ongoing fusion program to model future fusion systems to identify issues and to provide future directions. In late FY 1990, the ICF reactor design study will be initiated. In FY 1991, the ITER conceptual design activity and the ARIES study will be completed.

I. Development and Technology (Cont'd)

Some of the significant facilities utilized in the Development and Technology subprogram include the FENIX Test Facility at the Lawrence Livermore National Laboratory (LLNL) for testing of superconducting magnets; the Plasma Materials Test Facility at Sandia National Laboratories; the RF Test Facility at ORNL; the neutral beam test facilities at Lawrence Berkeley Laboratory (LBL); and a megawatt gyrotron test facility at Varian. The Tritium Systems Test Assembly (TSTA) at Los Alamos National Laboratory and the fusion material, work in the High Flux Irradiation Facility (HFIR) at ORNL and in the Fast Flux Test Facility (FFTF) at Richland are also supported under collaborative agreements with Japan.

The following table summarizes the operating expense funding for the Development and Technology subprogram.

II. A. Summary Table: Development and Technology

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Plasma Technologies				
Magnetic Systems	$ 6,966	$ 5,423	$ 5,000	- 8
Heating and Fueling	13,239	9,117	9,900	+ 9
Subtotal, Plasma Technologies	$ 20,205	$ 14,540	$ 14,900	+ 2
Fusion Technologies				
Fusion Nuclear Technology	$ 6,460	$ 5,515	$ 5,600	+ 2
Environmental & Safety	2,100	2,055	2,060	0
Fission Materials	14,721	13,274	13,500	+ 2
Subtotal, Fusion Technologies	$ 23,281	$ 20,844	$ 21,160	+ 2
Fusion Systems Analysis	10,659	12,035	12,000	0
Total, Development and Technology	$ 54,145	$ 47,419	$ 48,060	+ 1

II. B. Major Laboratory and Facility Funding

	FY 1989	FY 1990	FY 1991	% Change
Argonne National Laboratory	$ 4,273	$ 3,258	$ 3,435	+ 5
University of California at Los Angeles	3,100	2,800	2,765	- 1
Lawrence Livermore National Laboratory	11,311	9,970	9,860	- 1
Los Alamos National Laboratory	2,785	2,520	2,555	+ 1
Massachusetts Institute of Technology	3,400	2,700	2,490	- 8
Oak Ridge National Laboratory	12,923	8,332	9,290	+ 11
Pacific Northwest Laboratory	3,525	3,297	3,125	- 5
Sandia National Laboratory	4,160	2,700	3,950	+ 2

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Development and Technology			
Plasma Technologies	A focused development program in high field, steady state and pulsed superconducting magnets for ITER was maintained with international cooperation.	Technology for superconducting high field radiation tolerant magnets for ITER continued. U.S. demonstration of poloidal coil tests begun in Japan.	U.S. demonstration tests of poloidal coil completed in Japan. Base technology program maintained to develop superconductors and struc -1 materials data at cryogenic temperatures for ITER. FENIX high field test facility available for international collaborations.
	ICRF development was maintained to develop and test a system for C-Mod and CIT. Efforts were continued to be applied to ECH and negative ion neutral beam development to access improved techniques for heating, current drive and plasma control for near term machines and ITER.	High power CIT prototype ICRF antenna under construction for C-Mod for testing. Some Fusion Materials Irradiation Test Facility (FMIT) power unit development modifications completed for CIT. Increased emphasis on 1 MW gyrotron ECH source development for DIII-D. Fast wave current drive antenna completed for DIII-D.	C-Mod antenna completed and shipped to MIT. Small scale negative ion source for ITER tested. Complete 1 MW gyrotron test facility and test 1 MW steady state gyrotron.
	Development efforts on higher performance pellet injectors is emphasized because of the need to fuel higher temperature and higher density plasmas in CIT and ITER.	Higher speed pellet injector approaches assessed and narrowed to one or two.	Development efforts maintained on higher speed fueling devices for CIT and ITER.
	$ 20,205	$ 14,540	$ 14,900
Fusion Technologies	In the plasma/materials interaction/high heat flux area, ITER, TFTR, and CIT support was continued, as was support for international collaborations on TEXTOR, ASDEX, and TORE SUPRA. Innovative impurity control techniques were pursued. Carbon-based, beryllium and high Z materials were investigated.	In the plasma/materials interaction/high heat flux area, ITER, TFTR, and CIT support will continue, as will support for international collaborations on TEXTOR, ASDEX, and TORE SUPRA. Innovative impurity control techniques will be pursued. Carbon-based, beryllium and high Z materials will be investigated. The Tritium Systems Test Facility will be upgraded to densities which are ITER-relevant. Work on low Z materials, which are regeneratable	In the plasma/materials interaction/high heat flux area, ITER, TFTR, and CIT support will continue, as will support for international collaborations on TEXTOR, ASDEX, and TORE SUPRA. Innovative impurity control techniques will be pursued. Carbon-based, beryllium and high Z materials will be investigated. Work on low Z materials, which are regeneratable through plasma spraying, will be increased. Work on high Z materials for the divertor throat for

III. Development and Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Fusion Technologies (Cont'd)		through plasma spraying, will be increased.	ITER will be increased.
	In the neutron interactive materials area, continued research and development on reduced activation materials. Continued irradiation testing in the FFTF/MOTA. Participated in IEA irradiation facility studies.	In the neutron interactive materials area, continue irradiation testing in HFIR and FFTF in cooperation with Japan and with IEA partners. Continue R&D in support of ITER and CIT including low activation steel, fracture behavior, and special purpose ceramics and diagnostic system materials.	In the neutron interactive materials area, continue testing in HFIR and FFTF in support of CIT and ITER, as well as future reactors.
	In the nuclear analysis area, blanket and shield technology area, conducted research on blanket system technologies with emphasis on ITER applications.	In the nuclear analysis area, blanket and shield technology area, continue research on reactor relevant blanket issues with the particular objective of design of ITER blanket modules.	In the nuclear analysis area, blanket and shield technology area, continue international cooperation in blanket research including design of next step tests. Maintain ITER blanket support.
	In the tritium processing technology area, continued joint operation of Tritium Systems Test Assembly (TSTA).	In the tritium processing area, continue joint operation of TSTA and install Japanese Atomic Energy Research Institute (JAERI's) Fuel Cleanup System into TSTA loop.	In the tritium processing area, continue joint operation of TSTA and initiate tritium testing of JAERI's Fuel Cleanup System.
	In the environment and safety program, experimental efforts were continued in the tritium, activation products, blankets, and magnet areas, along with the supporting analytical efforts. Initiated effort to develop and incorporate ESECOM computer models into fusion systems code.	In the environment and safety program, continue with experimental and analytical efforts in tritium, activation products, blankets, and magnet areas and complete ESECOM report. Initiate operation of small tritium laboratory at INEL.	In the environment and safety program, continue with experimental and analytical efforts in tritium, activation products, blankets, and magnet areas, focusing on key ITER safety issues.
	$ 23,281	$ 20,844	$ 21,160
Fusion Systems Analysis	Maintained the ITER and the ARIES effort with completion in FY 1991.	Continue ITER conceptual design study. Continue the ARIES effort as planned with effort planned for completion in FY 1991. Initiate unclassified conceptual design of ICF reactors.	Complete the conceptual design of the ITER. A follow-on to ARIES will be started. Continue conceptual design study of an ICF reactor with completion in FY 1992.

III. Development and Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Fusion Systems Analysis (Cont'd)	$ 10,650	$ 12,035	$ 12,000
Development and Technology	$ 54,145	$ 47,419	$ 48,060

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

MAGNETIC FUSION ENERGY

I. Preface: Planning and Projects

II. A. Summary Table: Planning and Projects

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Planning and Projects	$ 1,122	$ 4,206	$ 4,250	+ 1
Total, Planning and Projects	$ 1,122	$ 4,206	$ 4,250	+ 1

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Planning and Projects	Continued the program's legal obligation to support the SBIR program; continue support for non-fusion landlord responsibilities.	Continue the program's legal obligation to support the SBIR program; continue support for non-fusion landlord responsibilities.	Continue the program's legal obligation to support the SBIR program; continue support for non-fusion landlord responsibilities.
	$ 1,122	$ 4,206	$ 4,250
Planning and Projects	$ 1,122	$ 4,206	$ 4,250

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ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

MAGNETIC FUSION ENERGY

I. Preface: Program Direction

This subprogram provides the Federal staffing resources and associated funding needed to plan, direct, manage, and administer the highly scientific and technical research and development program in fusion energy. This program supports the national goal to provide an adequate supply of environmentally safe energy at reasonable cost and uses international collaboration as a major resource and to avoid needless duplication.

II. A. Summary Table: Program Direction

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Salaries and Expenses	$ 3,967	$ 4,670	$ 5,390	+ 15
Other	633	260	260	0
Total, Program Direction	$ 4,600	$ 4,930	$ 5,650	+ 15

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Program Direction			
Salaries and Expenses	Provided funds for salaries, benefits, and travel for 60 full-time equivalents (FTE's) in the Office of Fusion Energy and related program and management support staff. Staff activities include: policy development; preparation of technical research and development plans; assessment of scientific needs and priorities; development and defense of budgets; review, evaluation, and funding of research proposals; monitoring, evaluation, and direction of laboratory work and allocation of resources; oversight of implementation of university and industrial research programs; oversight of construction and operation of scientific R&D facilities; control of interagency and international liaison and negotiation; and related program and management support activities. Focused on the program management and key technical issues required for an ignition project including R&D prototypes for several critical components and extensive use of international collaboration to advance the program in a timely way, especially through joint projects, such as R&D and conducting the conceptual design for the ITER.	Provide funds for salaries, benefits, and travel related to 62 FTE's included in the FY 1990 budget, including normal increased personnel costs. A revised request for two additional FTE's above that level will provide enhanced oversight of environment, safety, and health (ES&H) activities related to nuclear safety, health physics, occupational safety and industrial hygiene, environmental protection, hazardous waste management, safeguards and security, emergency preparedness, and quality assurance. Perform safety appraisals and environmental compliance audits to ensure compliance with ES&H directives and regulations at fusion energy facilities.	Provide funds for salaries, benefits, and travel related to 64 FTE's. The increased funding will provide for two additional FTE's above the FY 1990 budget level, as discussed in FY 1990, and for the normal increased personnel costs resulting, for example, from within-grade and merit increases and the impact of the FY 1990 general and executive pay raises. Continue to support the increased ES&H responsibilities discussed in FY 1990. Continue to participate in international collaboration to advance the program in a timely way.
	$ 3,967	$ 4,670	$ 5,390

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III. Program Direction (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Other	Provided funds for a variety of program support services such as printing and editing, supplies, and materials. Also included contractual support, for example, to assist with the environment, safety and health workload required by current regulations and directives and for timesharing on various information systems and communications networks.	Continue the variety of program support required in FY 1989.	Continue the variety and level of program support required in FY 1990.
	$ 633	$ 280	$ 280
Program Direction	$ 4,600	$ 4,930	$ 5,650

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KEY ACTIVITY SUMMARY

MAGNETIC FUSION ENERGY

I. Preface: Capital Equipment

The capital equipment request for FY 1991 of $14,310,000 supports the procurement of essential hardware to facilitate the conduct of the experimental program. This permits the effective utilization of devices and people. In addition, general purpose equipment needs at ORNL as part of the program's landlord responsibilities at the ORNL. Much of this equipment is used to support the operation of the fusion experimental devices or to make measurements and gather technical data. Some of this equipment replaces existing obsolete equipment while other items of equipment are new items of equipment required to allow the science to advance. Listed below is a summary of the specific capital equipment needs by program area.

II. A. Summary Table: Capital Equipment

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Confinement Systems	$ 8,435	$ 6,635	$ 6,650	0
Applied Plasma Physics	2,445	536	1,720	+221
Development and Technology	4,155	2,938	2,840	- 3
Planning and Projects	3,800	3,221	3,100	- 4
Total, Capital Equipment	$ 18,835	$ 13,330	$ 14,310	+ 7

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Capital Equipment			
Confinement Systems	Continued maintenance and modest upgrades to data acquisition systems by replacing/upgrading output devices, analog to digital convertors, mass storage systems, etc., as needed. Purchased necessary power supplies, oscilloscopes, vacuum hardware, spectrum analyzers, amplifiers, detectors, RF test equipment, and safety equipment to carry out experimental programs on D-III-D, ATF, PBX, MTX, and TFTR. Initiated purchase of main thyristor power supplies for Alcator C-MOD.	Complete purchase of main thyristor power supplies for Alcator C-MOD.	Equipment support provided to support experimental operations of existing devices. Continue maintenance and modest upgrades to data acquisition systems by replacing/ upgrading output devices, analog to digital convertors, mass storage systems, etc., as needed for DIII-D, PBX and TFTR.
	$ 8,435	$ 6,635	$ 6,650
Applied Plasma Physics	Continued acquisition of power system for CPRF. Provided general laboratory equipment for experimental research at national laboratories including plasma control and diagnostic equipment and equipment for alpha diagnostic devices.	Provide general laboratory equipment for experimental research at national laboratories including plasma control and diagnostic equipment and equipment for alpha diagnostic devices.	Provide general laboratory equipment for experimental research at national laboratories including diagnostic equipment for the Confinement Physics Research Facility.
	$ 2,445	$ 536	$ 1,720
Development and Technology	Special and general purpose equipment was purchased to increase the efficiency and productivity of the research and development efforts and technology test facilities.	Special and general purpose equipment is purchased to increase the efficiency and productivity of the research and development efforts and technology test facilities.	Special and general purpose equipment is purchased to increase the efficiency and productivity of the research and development efforts and technology test facilities.
	$ 4,155	$ 2,938	$ 2,840

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III. Capital Equipment (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Planning and Projects	Purchased general purpose equipment to support non-fusion-specific landlord responsibilities at ORNL to replace obsolete and worn equipment and to provide new state-of-the-art equipment.	Purchase general purpose equipment to support non-fusion specific landlord responsibilities at ORNL to replace obsolete and worn equipment and to provide new state-of-the-art equipment.	Purchase general purpose equipment to support non-fusion specific landlord responsibilities at ORNL to replace obsolete and worn equipment and to provide new state-of-the-art equipment slightly below the FY 1990 level.
	$ 3,800	$ 3,221	$ 3,100
Capital Equipment	$ 18,835	$ 13,330	$ 14,310

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ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

MAGNETIC FUSION ENERGY

I. Preface: Construction

II. A. Summary Table: Construction

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Compact Ignition Tokamak	$ 3,500	$ 0	$ 0	0
General Plant Projects	8,652	7,680	8,000	+ 4
Confinement Physics Research Facility	0	10,915	11,100	+ 2
Total, Construction	$ 12,152	$ 18,595	$ 19,100	+ 3

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Construction			
Compact Ignition Tokamak	Effort provided for continuation of detailed design of CIT device components and systems.	No activity.	No activity.
	$ 3,500	$ 0	$ 0
General Plant Projects	Supported projects to meet health, safety, and programmatic requirements and to provide miscellaneous modifications, additions, alterations, and non-major new construction items to meet programmatic goals.	Support projects to meet health, safety, and programmatic requirements and to provide miscellaneous modifications, additions, alterations, and non-major new construction items to meet programmatic goals.	Support projects to meet health, safety, and programmatic requirements and to provide miscellaneous modifications, additions, alterations, and non-major new construction items to meet programmatic goals.
	$ 8,652	$ 7,680	$ 8,000
Confinement Physics Research Facility	Supported as an operating expense funded project.	Proceed with fabrication of the coils and vessel/shell.	Complete fabrication of coils and vessel/shell and begin installation of these components. Complete generator start-up tests.
	$ 0	$ 10,915	$ 11,100
Construction	$ 12,152	$ 18,595	$ 19,100

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ENERGY SUPPLY RESEARCH AND DEVELOPMENT
OFFICE OF ENERGY RESEARCH
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KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Magnetic Fusion Energy

IV. A. Construction Project Summary

Project No.	Project Title	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Unappropriated Balance	TEC
89-R-800	Confinement Physics Research Facility	41,584	10,915	11,100	12,001	75,600 a/
GP-E-900	General Plant Projects	0	0	8,000	0	8,000
88-R-901	General Plant Projects	0	7,680	0	0	7,680
Subtotal, MFE Construction		$ 41,584	$ 18,595	$ 19,100	$ 12,001	
Operating Funded						
-	Alcator C-Modification	13,800	3,410	390	0	17,600
Subtotal, OE Funded		$ 13,800	$ 3,410	$ 390	$ 0	
Total, MFE		$ 55,384	$ 22,005	$ 19,490	$ 12,001	

a/ CPRF proposed as a line item construction project in FY 1990. This project was authorized and appropriated as an operating expense funded project through FY 1989. Recent reductions in the appropriation and from the sequestration to the FY 1990 level for this project have led to the need to defer work into subsequent years. The impact on the total estimated cost and schedule from this action are under review.

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OFFICE OF ENERGY RESEARCH
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Magnetic Fusion Energy

IV. B. Plant Funded Construction Project

1. Project title and location: 89-R-800 Confinement Physics Research Facility
Los Alamos National Laboratory

Project TEC: $75,600 1/
Start Date: 1st Qtr. FY 1986
Completion Date: 4th Qtr. FY 1993 1/

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1986	$ 7,711	$ 7,711	$ 3,599
1987	11,850	11,850	7,692
1988	11,293	11,293	13,812
1989	10,730	10,730	13,792
1990	10,915	10,915	10,915
1991	11,100	11,100	11,100
1992	10,139	10,139	10,700
1993	1,862	1,862	3,990

3. Narrative:

(a) The presently operating reversed field pinch (RFP) devices have achieved outstanding experimental results which surpass design specifications. It is now important to extend the plasma current capability in order to test energy confinement. As a result, a device having a 1.7 MA capability will be fabricated. This new facility will bring to the fusion program an experimental capability to explore, in a multikilovolt collisionless regime, the physics properties of a toroidal confinement concept that has the theoretical potential (in a future device) of ohmic heating to ignition with low magnetic fields at the magnet coils.

1/ Recent reductions in the FY 1990 level for this project have led to the need to defer work into subsequent years. The impact on the total estimated cost and schedule from this action are under review.

(b) The CPRF includes an existing test cell and space in an adjacent building and will consist of magnetic field coils, vacuum system, control system, structural support, and power supply system.

(c) Certain key features of the CPRF will be sized with an ultimate capability of 4 MA, thereby facilitating a cost effective upgrade to the 4 MA operating level in the future, if warranted.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991	To Complete
Construction.....	$30,854	$11,230	$11,404	$11,500	$ 14,499
Capital Equipment.....	0	0	0	0	0
Operating Expenses.....	0	0	0	0	0

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OFFICE OF ENERGY RESEARCH
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Magnetic Fusion Energy

IV. B. Plant Funded Construction Project

1. Project title and location: GP-E-900 General Plant Projects
Various locations

Project TEC: $ 8,000
Start Date: 1st Qtr. FY 1991
Completion Date: 4th Qtr. FY 1992

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1991	$ 8,000	$ 8,000	$ 2,640
After 1991	0	0	5,360

3. Narrative:

(a) This project supports many small alterations, additions, modifications, replacements, and non-major new construction items required annually to provide continuity of operation, improvement in economy, road and structure improvements, elimination of health and safety hazards, minor changes in operating methods, and protection of the Government's significant investment in facilities. Currently the estimated distribution for FY 1991 by laboratory is as follows:

Los Alamos National Laboratory	$ 400,000
Princeton Plasma Physics Laboratory	1,500,000
Oak Ridge National Laboratory	6,100,000
	$ 8,000,000

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 8,652	$ 7,680	$ 8,000	$ 0
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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OFFICE OF ENERGY RESEARCH
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Magnetic Fusion Energy

IV. C. Operating Expense Funded Construction Project

1. Project title and location: Alcator C-Modification
Massachusetts Institute of Technology
Cambridge, Massachusetts

Project TEC: $17,600
Start Date: 1st Qtr. FY 1987
Completion Date: 3rd Qtr. FY 1991

2. Financial schedule (Construction cost, capital equipment and operating expenses (BA))

	Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
Construction.....	$ 8,900	$ 4,900	$ 3,410	$ 390	$ 0
Capital Equipment.	500	3,500	700	0	0
Operating Expenses	7,260	3,235	1,505	0	0

3. Narrative:

(a) The Alcator C-Mod. project will provide a unique device, using existing support facilities, to conduct a test of recent improvements in tokamak physics design of the Compact Ignition Tokamak (CIT). Alcator C-Modification will allow us to develop operational techniques and control methods to produce high temperature, high density, well confined plasmas. Specific areas of physics investigation include ion cyclotron radiofrequency heating, plasma edge control, pellet fueling, impurity control, and current ramp-up.

(b) The major objective of Alcator C-Mod. is to provide unique and valuable information on transport in high density plasmas with intense ion cyclotron resonant frequency heating.

(c) Alcator C-Mod is finished and operation of the tokamak begins in late 1990. 4-5MW of ICRF heating system will be installed for later operation.

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VOLUME 2

SUPPORTING RESEARCH AND TECHNICAL ANALYSIS

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DEPARTMENT OF ENERGY

FISCAL YEAR 1990 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 2

SUPPORTING RESEARCH AND TECHNICAL ANALYSIS

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

OVERVIEW

BASIC ENERGY SCIENCES

This country has long recognized the importance of basic research and has considered the Federal investment in its scientific base a top national priority. The Basic Energy Sciences (BES) program is an essential component of both the Department and the Federal commitment to R&D in the U.S. today. Working with the national laboratories, universities, industry, and other government agencies, the BES program supports research which provides the foundation for new technologies and improvements to existing technologies which are crucial to achieving the goals described in the National Energy Plan.

Basic research is the first link in the chain of events from scientific discovery to technological innovation. Results from BES sponsored research become an integral part of the information base which underpins the nation's nuclear and non-nuclear technologies. In addition to supporting research for the country's technology foundation, BES supported research helps to train our future scientists, and helps us attain our national goals. Better health and quality of life, economic competitiveness, energy self-sufficiency, and national security are each supported from a strong program in basic research. The research in the BES program is grouped into six major subprogram areas: materials sciences, chemical sciences, applied mathematical sciences, engineering and geosciences, energy biosciences, and advanced energy projects.

The principal focus of the BES program is directed toward supporting the Department's energy goals; however, a number of other important national goals are also supported. The U.S. leadership in science and technology, the stimulation of economic growth, national defense, and the training of tomorrow's scientists are additional goals to which BES contributes through the support of basic research.

BES sponsored research provides the foundation for research in each of the DOE energy technology programs. This link is described in each of the introductions which describe the subprograms within BES. Whether the research is in the Materials Sciences, Chemical Sciences, or any of the other subprograms of BES, the research is primarily driven by the need for enhanced knowledge or understanding which is currently limiting existing energy technologies. The link between basic research and applications, however, is typically not confined to any single energy or technological problem, but has applications to a number of technologies. As an example, a new or improved ceramic material may be applied to energy systems whether they be fossil, nuclear, automotive, or may serve as the most effective way to store radioactive waste. Improved high temperature superconducting materials also hold this same potential to be applied to a number of energy technologies such as more efficient motors, generators, power transmission lines and transportation systems which will have tremendous economic and energy savings. Each of the subprograms in BES support similar

research projects which have applications across a broad range of energy technologies. Whether we are trying to burn coal cleaner, or more cheaply find ways to reduce the overall volume or hazards from wastes, whether nuclear or non-nuclear, each of these problems will ultimately depend on the results from basic research and the applications of those results in the various energy technologies.

The BES program supports research in several ways. The BES program annually supports approximately 1,400 individual research projects at over 200 separate institutions with direct support for over 4,000 investigators in the physical, biological, and mathematical sciences. These projects are selected on the basis of scientific excellence, relevance to support of DOE long-term goals, and their contribution toward a responsive research program. Also, Basic Energy Sciences has a heavy involvement in major scientific user facilities (the High Flux Beam Reactor and the National Synchrotron Light Source at Brookhaven National Laboratory, the Combustion Research Facility at Sandia National Laboratories Livermore, the High Flux Isotope Reactor and the Radiochemical Engineering Development Center (formerly the Transuranium Processing Plant) at Oak Ridge National Laboratory, the Stanford Synchrotron Radiation Laboratory at Stanford University, the Intense Pulsed Neutron Source at Argonne National Laboratory and the Manuel Lujan, Jr. Neutron Scattering Center at Los Alamos National Laboratory).

These major facilities account for a significant amount of the BES budget requirement. In general, facility costs have risen by an amount greater than the cost of living. These higher costs can be attributed to higher than normal utility costs, safeguards, safety and higher user demands, as well as the need for the most modern equipment. The large, expensive, unique facilities in the BES program are made available to qualified users of the U.S. scientific community to the extent that funds permit. At the seven major user facilities funded by BES, there were about 1,500 users from all scientific disciplines and programs which resulted in approximately 790 publications for FY 1989. The activity around these facilities is growing and the number of users is estimated at about 2,000 for FY 1990. Many areas of modern science require large and costly facilities; without them, the necessary advanced research could not be done. BES also is providing advanced state-of-the-art computational support for several Energy Research programs other than Magnetic Fusion Energy [which is directly supported by the National Magnetic Fusion Energy Computer Center (NMFECC)], e.g., High Energy Physics, Nuclear Physics, and Biological and Environmental Research, as well as its own program.

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To fully appreciate the importance of the national user facilities, one only has to look at the list of users at the facilities to understand their importance to energy and high technology in this country. For example, at the light sources, the largest U.S. companies (e.g., IBM, AT&T, Exxon, GM) have major research teams doing research in areas such as catalysis, electronics, polymers, biomedical, etc., not only important to those companies, but also important to the DOE goals. At the neutron sources, major oil companies are doing research in porocity of formations and neutron spectroscopy of hydrocarbons in cores and in coal. The Basic Energy Sciences program also has significant research in radiation effects on materials important to fission, fusion, and radioactive waste technology. Major university and Government laboratory teams are

located at the facilities and, just as with the major U.S. companies, the capability made possible at the facilities simply does not exist elsewhere. Advances in materials, chemistry, biology and the next generation of computer chips depend on these facilities.

The BES strategy continues to be:

- o Provide critical knowledge and data by supporting basic research relevant to DOE mission areas;
- o Provide and support operation of unique, specialized research facilities;
- o Exchange information with other DOE programs, Federal agencies, and the academic and industrial scientific communities;
- o Take full advantage of the scientific and industrial communities' identification of needs and opportunities for research in areas likely to be relevant to future energy options;
- o Develop trained scientific talent through support of basic research at universities and national laboratories; and
- o Promote early applications of the results of basic research.

The Basic Energy Sciences program takes advantage of the research capabilities available at national laboratories, government laboratories, universities, and private research laboratories. The program support can be divided into three major components: research, facility operations, and construction. The facility operations component supports the operation of major user facilities for which access by qualified users is provided to the scientific community. Another component of the program, which is the largest component, is research support which takes place at national laboratories, universities and other institutions. By the very nature of the national laboratories and their traditional focus, they are especially valuable in doing research which is applicable to a number of energy concepts. The interactions possible are very great because laboratory scientists are frequently involved in many aspects of the applied energy programs. In addition, the stability of the organization and specialized capabilities which exist at the laboratories in many instances are unmatched. Many of the scientists involved in BES research programs are faculty or students at universities. Their research is enhanced through access to special facilities at national laboratories. More than one-third of BES funding supports university-based research. The list of universities receiving support covers almost every state and includes participation by both large and small institutions. The third component is the construction of facilities needed by the Department and the Nation.

In addition to universities and national laboratories, BES supports research in and maintains ties with industry. Representatives from different industries serve on the BES Advisory Committee; experts from industry participate in the review of research proposals and use the specialized facilities sponsored by

BES; industrial scientists participate in program advisory committees at the national laboratories; and industry representatives are invited to attend BES conferences and workshops on special topics.

The U.S. has been the world leader in science and technology and has derived many economic benefits from its leadership. The Department of Energy and its multiprogram laboratories play an important role in the Nation's scientific enterprise that is essential for our preeminence. A central feature of this role has been construction and operation of large, specialized scientific facilities that are used by scientists from universities and industry as well as the national laboratories. Many of the scientific facilities in our multiprogram laboratories are old. In order to make further progress in certain fields, new, more powerful facilities are required.

In the past few years, the Department has given special attention to correcting deficiencies at its laboratories in environment, health, safety, security, safeguards, multiprogram energy purpose facilities and other such areas. However, less attention has been paid to improving the essential scientific facilities required to accomplish the main scientific mission of the laboratories, i.e., preeminence in certain key fields of research. Three facilities have been identified by the scientific community as being the most critical to the future needs of the Department's Basic Energy Sciences program. The three facilities, all of which will be located at the Department's multiprogram laboratories are: 1-2 GeV Synchrotron Radiation Source - Lawrence Berkeley Laboratory; 6-7 GeV Synchrotron Radiation Source - Argonne National Laboratory; and Advanced Neutron Source - Oak Ridge National Laboratory.

The FY 1991 request for the Basic Energy Sciences program attempts to address not only the need for these powerful new facilities but also a continuing need for research essential to meeting the long-term goals of the Department and Nation. The request can be categorized into three areas: continuation of a strong basic program, operation of major user facilities at reasonable levels, and construction of advanced facilities.

The FY 1991 budget includes the following significant changes to the program underway in FY 1990: 1) a new effort is included in the Advanced Energy Projects subprogram to transfer synchrotron radiation technology (x-ray lithography) to industry for use in developing next generation computer chips; 2) funds are included for the first time for the reimbursement of costs for highly enriched uranium and heavy water used in the operation of the High Flux Isotope Reactor and the High Flux Beam Reactor; and 3) a funding increase has been included as planned to ensure the timely construction of the 6-7 GeV Synchrotron Radiation Source. Other smaller changes in the budget have been made in each of the subprograms in order to address the highest priority goals within the Department. In addition, effective in FY 1990 the management responsibility for the operation of research reactors funded by the Basic Energy Sciences program is now assigned to the Assistant Secretary for Nuclear Energy. Funding responsibility and the scientific utilization of these reactors remains with the BES program.

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The FY 1991 budget for the Applied Mathematical Sciences subprogram has been prepared and reviewed to respond to the FCCSET initiative in High Performance Computing. The program that is in place in FY 1989 and FY 1990 is supportive of this initiative within available resources. The DOE program represents an integral component of the government-wide effort. Supplemental material in the Applied Mathematical Sciences justification is provided to explain in greater detail the DOE response to this initiative.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

LEAD TABLE

Basic Energy Sciences

Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Base	FY 1991 Request	Program Change Request vs Base	
					Dollar	Percent
Operating Expenses						
Materials Sciences	$173,660	$198,741	$198,741	$221,954	$+ 23,213	+ 12
Chemical Sciences	127,817	140,256	140,256	150,500	+ 10,244	+ 7
Applied Mathematical Sciences	42,135	43,705	43,705	47,975	+ 4,270	+ 10
Engineering and Geosciences	32,770	33,204	33,204	32,500	- 704	- 2
Advanced Energy Projects	14,358	14,591	14,591	24,000	+ 9,409	+ 64
Energy Biosciences	20,374	20,647	20,647	20,200	- 447	- 2
Program Direction	4,900	5,374	6,500	6,500	+ 0	+ 0
Subtotal Operating Expenses	416,014	456,518	457,644	503,629	+ 45,985	+ 10
Capital Equipment	31,700	36,486	36,486	37,019	+ 533	+ 1
Construction	86,621	76,833	76,833	108,034	+ 31,201	+ 41
Total	$534,335 a/b/	$569,837 b/c/	$570,963	$648,682	$+ 77,719	+ 14
Operating Expenses	(416,014)	(456,518)	(457,644)	(503,629)	+ 45,985	+ 10
Capital Equipment	(31,700)	(36,486)	(36,486)	(37,019)	+ 533	+ 1
Construction	(86,621)	(76,833)	(76,833)	(108,034)	+ 31,201	+ 41
Staffing (FTEs)	64	70	70	70		

Authorization: Section 209, P.L. 95-91.

a/ Total has been reduced by $5,274,000 which has been transferred to the SBIR program.
b/ Reflects comparability adjustment for new Environmental Restoration and Waste Management program as follows: FY 1989 - $9,677,000; FY 1990 - $12,654,000; FY 1991 - $17,268,000
c/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Basic Energy Sciences

FY 1990 Appropriation	$ 569,837
Adjustments - Increased personnel costs	+ 1,126
FY 1991 Base	$ 570,963
Operating Expenses	
- Provides funds to meet funding requirements at the major BES user facilities including the reimbursement for the heavy water and highly enriched uranium requirements of the two nuclear reactors (HFIR and HFBR) funded by the BES program	$ 31,715
- Provides a limited increase to address the essential elements of the Government-wide initiative in high performance computing	4,270
- Provides funds to support the transfer of synchrotron radiation technology for use in x-ray lithography important for the next generation of computer chips	10,000
Capital Equipment	
- Provides for a modest increase in equipment costs	533
Construction	
- Provides for continuing projects underway in FY 1990, including funding for General Plant Projects, Accelerator Improvements Projects, and the 1-2 GeV Synchrotron Radiation Source. Additional funds are provided for the 6-7 GeV Synchrotron Radiation Source offset by the funding decrease which resulted by the completion of funding for the 3 GeV Spear Injector	31,201
FY 1991 Congressional Budget Request	$648,682

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

BASIC ENERGY SCIENCES

I. Preface: MATERIALS SCIENCES

The Materials Sciences subprogram conducts research aimed at increasing the understanding of materials related phenomena and behavior which addresses the materials needs for safe, reliable, and environmentally acceptable energy technologies including fusion, fission, fossil, solar, geothermal, conservation, and waste containment. The subprogram supports research at DOE laboratories, universities, and to a lesser extent in industry. The laboratory component is the largest and accounts for approximately 50% of the research funding, excluding facility operations. The major laboratory participants are the Ames Laboratory, Argonne National Laboratory, Brookhaven National Laboratory, Oak Ridge National Laboratory, Lawrence Berkeley Laboratory, and to a lesser extent Los Alamos, Lawrence Livermore, Pacific Northwest, and Sandia Laboratories. The laboratory programs as a whole tend to contain larger groups of scientists, are multidisciplinary, and involve longer-term research projects. Many of the DOE laboratory programs have unique, major facilities which are open to outside users from universities, industry, and other government laboratories. The university component of the program includes top researchers from universities throughout the country. A typical project includes several graduate students in addition to the principal investigator. The projects cover all areas of materials sciences and tend to be narrower in scope and of shorter duration than projects at the laboratories. The funding associated with the university portion of the program is approximately 15% excluding facilities funding. Most of the industry supported portion of materials research takes place at smaller businesses through the Small Business Innovation Research program. Other industry groups are funded by their home organization and work with members of the laboratory or university research groups. Due to the unique, expensive, and specialized nature of the user facilities, the largest participation of industry researchers occur at these facilities. So long as the research conducted by industry is available to the scientific community and is of interest to DOE, there is no charge imposed on the industry groups for the use of these facilities.

Groups of multidisciplinary researchers work together guided by opportunities within the general goals set forth by the subprogram. Current goals include uncovering the information needed to: develop new or substitute materials that improve performance or efficiency in energy systems; tailor materials properties to satisfy defined requirements such as improved corrosion resistance in fossil plants or radiation resistance in fusion plants; predict materials problems and service life to improve safety and reliability of components in energy systems; and improve the theoretical and experimental capability to analyze the fundamental structure and behavior of materials. Related to these goals is the support provided for major user facilities which are available to the entire scientific community for research. Coordination among the various materials research efforts within DOE and with other agencies is considered essential. Within DOE this takes place primarily through the Energy Materials Coordinating Committee (EMaCC) and with other agencies through the Committee on Materials (COMAT). Within the Materials Sciences subprogram, research is undertaken in the major areas of metallurgy and ceramics, solid state physics and materials chemistry. Some examples of research accomplishments during the past year include:

I. Preface: MATERIALS SCIENCES (Cont'd)

understanding the mechanism of accelerated embrittlement in nuclear reactor pressure vessel materials, the growth of ceramic films by a biomimetic method, successful development of a computational technique for understanding the atomic structure and mechanical behavior of grain boundaries in metals, direct evidence of lattice stiffening during the transition to superconducting behavior, analysis of the twin boundary structure in a ceramic superconductor, the first superconducting thin films from the new thallium containing high temperature superconductors, nuclear magnetic resonance determination of the valence state of copper in single crystal Y-Ba-Cu oxide superconductors, development of a new nuclear magnetic resonance (NMR) technique called stationary orbit spinning which extends NMR to new classes of materials, and demonstration that neutron reflectometry can be used to characterize the binding and structure of polymeric materials.

II. A. Summary Table

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Materials Sciences Research....	$126,149	$143,380	$141,522	- 1
Facilities Operations.....	47,511	55,361	80,432	+ 45
Total, Materials Sciences....	$173,660	$198,741	$221,954	+ 12

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory....	$ 28,300	$ 31,717	$ 38,832	+ 22
Brookhaven National Laboratory.	38,714	40,602	51,744	+ 27
Lawrence Berkeley Laboratory...	16,236	20,209	26,352	+ 30
Oak Ridge National Laboratory..	30,288	29,008	25,822	- 11

III. Activity Descriptions

MATERIALS SCIENCES

Program Activity	FY 1989	FY 1990	FY 1991
Metallurgy and Ceramics Research	Increased emphasis on processing and understanding structure-property relationships of new high temperature superconductors continued. Effort	Continued emphasis on processing and understanding structure-property relationships of new high-temperature superconductors. Efforts on	Reduction of effort on understanding processing-structure-property relationships in ceramic superconductors. Continue efforts on

III. MATERIALS SCIENCES RESEARCH (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Metallurgy and Ceramics Research (Cont'd)	continued on theoretical approaches to study the behavior of materials, on reliability and lifetime prediction of materials, on bonding and adhesion at interfaces, and on compound semiconductors. Continued approximately constant level of effort on properties of artificially tailored materials, radiation induced changes in materials, fracture in extreme conditions, and advanced energy materials such as high performance metallic alloys, ceramics, and magnetic materials.	theoretical approaches to the behavior of materials, advanced energy related materials such as high-performance alloys and ceramics, bonding and adhesion of interfaces, and of compound semiconductors will continue. Significantly reduced levels of effort on the properties of artifically tailored materials and on fracture.	theoretical approaches to high performance metals and ceramics, structure-behavior relationship to interfacial bonding and adhesion. Continued reduction of effort on artificially tailored materials, fracture behavior and intermetallic compounds. Increase in research on radiation effects of materials, particularly related to waste minimization or reduction.
Solid State Physics Research	Expanded interlaboratory program and new university grants for research on solid state physics of high temperature superconductivity. Use of neutrons and synchrotron radiation for accurate studies of structure, dynamics and electronic configurations of high temperature superconductors. Research emphasizing use of synchrotron radiation, tunneling electron microscopy, ion and molecular beams and other new tools and probes for preparation, characterization and modification of thin films and surfaces. Theoretical research on new materials design. Maintained strength of overall	Sustained thrust via interlaboratory program and university grants for research on solid state physics of high temperature superconductivity. Continue thrust using neutrons and synchrotron radiation for accurate studies of structure, dynamics and electronic configurations of materials. Continued research emphasizing use of synchrotron radiation, tunneling microscopy, ion and molecular beams and other new tools and probes for preparation, characterization and modification of thin films and surfaces. Maintain strength of research effort on a priority basis.	Continue selected efforts and priority research largely unique to DOE, such as in neutron scattering and synchrotron radiation. Reduction of effort on physics of high temperature superconductivity. New effort on field responsive polymeric materials. Continue efforts on solid state physics of surfaces and interfaces. Research on solid state physics of novel materials with energy-related properties and behavior. Increased effort on physics of radiation effects.

III. MATERIALS SCIENCES RESEARCH (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Solid State Physics Research (Cont'd)	research effort but with some shifts in emphasis and support levels to accommodate changing priorities.		
Preconstruction R&D	Continued research and development necessary to support a DOE decision on a new reactor at ORNL.	Continue R&D on ANS.	R&D Support for ANS.
Materials Chemistry Research	Continued in research on new high temperature superconductors with expanded effort in chemical substitution to improve critical parameters. Research started on electrocatalysis using immobilized macromolecules, such as modified enzymes. Continued emphasis on the synthesis of new materials especially using modified or synthetic enzymes to make materials with tailored properties. Research continued on the electronic and magnetic properties of polymeric and organic materials and on high strength polymers. Base program in chemical structure, catalysis, and surface chemistry continues with increased emphasis on structural chemistry at solid-fluid interfaces.	Continue research on new high temperature oxide superconductors as well as organic superconductors emphasizing new synthetic routes to novel, single phase superconductors with improved critical parameters. Continued emphasis on the synthesis of new materials especially using modified or synthetic enzymes to make materials with tailored properties. Research will continue on organic and polymeric materials emphasizing electronic and magnetic properties of synthetic metals, semiconductors, and insulators and also including high strength polymer synthesis. Base program in chemical structure, surface chemical properties and polymer research with emphasis on structural chemistry at solid-fluid interfaces.	Strong emphasis on organic synthesis for synthetic metals, polymer electrolytes, high strength polymer systems, enzymatic systhesis, and the materials chemistry of high temperature superconductors. Synthesis and characterization of other novel materials of long range interest for energy systems, in cooperation with other Division programs. Increased emphasis on study of cooperative interactions of molecular species on surfaces.
	No Activity.	Implementation plans for the Energy Sciences Network (ESNET) project.	Upgrades of ESNET to conform to the National Research and Education

III. MATERIALS SCIENCES RESEARCH (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Materials Chemistry Research (Cont'd)		identified in the Applied Mathematical Sciences subprogram will proceed. This subprogram's share for the implementation of ESNET is $236.	Network standards will continue to be pursued and will be shared among ER programs that benefit from ESNET.
Subtotal Materials Science Research	$126,149	$143,380	$141,522
Facilities Operations	Additional support for major DOE user facilities to meet DOE requirements and user needs at HFBR, NSLS, SSRL, and IPNS. Continued R&D on the advanced scientific facilities: 1-2 GeV and 6-7 GeV light sources and the Advanced Neutron Source.	Continue support of national user facilities. Budgeted for preconstruction R&D for the 1-2 GeV and the 6-7 GeV light sources.	Increased support for major facilities in the Materials Sciences subprogram. Increased funding for uranium conversion and enrichment, heavy water costs, and safety requirements at HFBR. Increased support for R&D and commissioning of components at 1-2 GeV and 6-7 GeV light sources.
Subtotal Facilities Operations	$47,511	$55,361	$80,432
Total, Materials Sciences Operating Expenses	$173,660	$198,741	$221,954
Percentage Breakdown by Performer			
Laboratory	51%	50%	48%
University	20%	20%	14%
Industrial/Other	2%	2%	2%
Facility Operations	27%	28%	36%
Subtotal	100%	100%	100%
Number of Researchers Supported	1,045	1,045	1,090

I. Preface: CHEMICAL SCIENCES

The Chemical Sciences subprogram supports basic research across a broad front of chemistry and atomic physics necessary for the mid and long term development of energy technologies. Research includes photochemistry important to the conversion of light energy to fuels or electricity, chemical physics related to combustion processes and more efficient utilization of fossil resources, atomic physics important to fusion concepts, heavy element chemistry important to waste management, organic chemistry as well as heterogeneous and homogeneous catalysis related to coal conversion and better processes for the production of fuels and bulk chemicals, separations and analytical science related to almost every facet of process chemistry and nuclear energy technology, and chemical thermodynamics for predicting physical properties of complex hydrocarbon mixtures such as fuels. Basic research in these areas of chemistry related to the development of environmentally safe energy technologies and innovative approaches to waste management and cleanup are also supported. Recent noteworthy examples of research results that have had technological impact can be cited. One is the discovery and development of highly selective extractants leading to the TRUEX process for removing actinide elements from acidic solutions of high level radioactive waste. Another is the fundamental kinetics research that led to the RAPRENOX process for removing oxides of nitrogen, NOx, from combustion exhaust gases. Consistent with these goals, support is provided to major user facilities which are available to the entire scientific community for research. The budget for the Chemical Sciences subprogram is affected in a significant way in FY 1990 and FY 1991 by the necessity to meet facility requirements above the needs of the base research program. A number of studies, including a National Academy of Sciences study, recommended a number of safety improvements at the High Flux Isotope Reactor which are being addressed in both the FY 1990 and FY 1991 budgets. Other facility operating budgets are increasing substantially in FY 1991 to deal with maintenance problems and provide for more optimal use.

II. A. Summary Table

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Chemical Sciences Research.....	$ 84,105	$ 97,137	$ 95,987	- 1
Facilities Operations.....	43,712	43,119	54,513	+ 26
Total, Chemical Sciences.....	$127,817	$140,256	$150,500	+ 7

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory....	$ 16,538	$ 15,423	$ 15,523	+ 1
Brookhaven National Laboratory.	15,838	16,059	17,203	+ 7
Oak Ridge National Laboratory..	38,473	34,400	40,554	+ 18

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III. Activity Descriptions

CHEMICAL SCIENCES

Program Activity	FY 1989	FY 1990	FY 1991
Chemical Sciences Research	Theoretical and experimental examinations of the role of solvents in photochemical charge separation phenomena of model compounds designed for efficient conversion have been carried out.	The highest priority programs in chemical dynamics of combustion reaction systems and chemical catalysis would receive cost of living increases somewhat at the expense of existing programs. Research programs at the CRF and NSLS would continue at current levels. Most other programs would remain at FY 1989 or slightly reduced dollar levels. Modest growth is planned on photocatalysis, photoselective reaction pathways, solvent effects on photo induced electron transfer, and surface chemistry at semiconductor electrodes. Research on recoil hot atom chemistry will be reduced.	The characterization of solvent effects on photoinduced electron transfer which is critically important for solar photochemical energy conversion technologies will receive preferred emphasis, as will the related areas of photosynthesis and photoelectrochemistry. Studies on the characterization of solution properties using radiation chemistry techniques and the unique chemistry of highly energetic atoms will be maintained.
	Emphasis continued on the dynamics of small combustion related species central to improved models of combustion processes, and on metal cluster chemistry that may underpin an understanding of bulk properties.	New and/or increased efforts in research on the mechanisms of soot formation and the dynamics of chemical reaction related to combustion will be initiated. Cost-of-living adjustments will be deferred for those activities less directly related to combustion and cluster science related to catalysis. Support will be provided for expanded experimental and theoretical basic research in molecular sciences related to environmentally safe uses of energy and waste management.	Theoretical and experimental research on the detailed dynamics of chemical reactions related to combustion remains a high priority effort and will continue unabated. Support will increase for fundamental studies of interactions of atoms and molecules with surfaces and clusters as a means for developing general theories of catalysis. High priority will be given to experimental and theoretical research in molecular aspects of interfacial science to understand the reactivity and control or prevent transport of hazardous chemicals and species in the environment. The

Program Activity	FY 1989	FY 1990	FY 1991
Chemical Sciences Research (Cont'd)			availability of powerful supercomputers and laser-based optical techniques capable of time resolution of less than a trillionth of a second now allow the study of increasingly complex chemical reactions at a level of detail required to characterize processes spanning a diversity of existing and emerging energy technologies including artificial photosynthesis, combustion, and catalysis. The expanded effort will emphasize both theoretical and experimental efforts to characterize extremely fast or short-lived phenomena. The CRF will contribute substantially to the combustion part of this expanded effort.
	Dynamical effects of atomic systems in intense energy fields that occur under high flux conditions of photons, electrons or ions were studied. The Kansas State University Ion Collision Physics Facility has become completely operational.	New efforts in low temperature plasma physics research will be started to the degree possible. Studies designed to unravel ionic structures and the dynamics of interactions involving photons, electrons, and ions in atomic systems exposed to strong electrical and magnetic fields will be maintained.	Research on the characterization of the electronic structure and dynamics of multiply charged ions, particularly the exchange of energy and momentum during collisions of these ions with other ions, atoms, electrons, and photons, remains a high priority, benefitting both fusion energy and X-ray laser development. The program in theoretical atomic physics will be expanded. Recent experimental progress in the area of high-energy, atomic physics under extreme

III. CHEMICAL SCIENCES (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Chemical Sciences Research (Cont'd)			conditions far outstrips the theoretical and computational tools needed for the application of newly acquired knowledge to the development of fusion energy and X-ray laser technologies. New and improved theories are required to guide new experiments and to interpret existing data. Special attention will be given to university-based efforts in order to address a serious national shortage of high quality scientists trained in modern atomic physics theory..
	Research on shape selective oxide catalysts for the energy efficient conversion of paraffinic hydrocarbons to bulk chemicals were given priority. An initiative on research related to high temperature superconductors was started. The synthetic chemistry of novel inorganic and organometallic compounds and polymers which can serve as precursors to the new classes of perovskite ceramic superconductors has been examined.	The new program in materials precursor chemistry will be expanded to include chemistry of other advanced materials in addition to high temperature superconductors at the expense of selected projects in solution chemistry and isotope effects research. Heterogeneous and homogeneous catalysis research and the studies of the chemical and physical properties, structures, and reactivity of coal macromolecules will be continued.	Research programs in materials precusor chemistry, catalysis and coal chemistry will be given priority. Research leading to novel organometallic polymers, layered and zeolitic structures, membranes, polyoxometallates, and metal clusters will be supported. Their use in the preparation of advanced semiconductors, polymers, catalysts, superconductors, coated electrodes and separation membranes will be explored.

III. CHEMICAL SCIENCES (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Chemical Sciences Research (Cont'd)	Combustion related turbulence research and thermophysical properties of fossil derived mixtures continued to be emphasized.	Emphasis will be given to predictive models for fluid properties and phase equilibria of polymers, polydisperse systems and reverse micelles in supercritical fluids at the expense of lower priority research.	Continued emphasis will be given to thermodynamic properties of complex fluid mixtures involving large molecular size differences or energies of interactions as well as chain type molecules and ions.
	Research to effect direct measurement of heteroatoms in solid matrices such as coal were carried out. Novel analytical methods for handling polar compounds and direct chromatographic analysis of fossil derived process streams were explored.	The study of membrane separations methods of aqueous and gaseous species will be emphasized. The analytical characterization and speciation of trace components in aqueous media will be pursued.	The chemistry of interfacial phenomena important to membrane and other separations processes will be increased. Analytical methods to determine the spatial distribution and identity of molecular species at interfaces such as a membrane liquid interface will be supported. The design and synthesis of specific molecules complexing agents and reverse micelle work at near critical conditions will be modestly enhanced.
	Further research on actinide electronic properties and bonding in high temperature solid state mixed oxides and organoactinides were performed. Solid state actinide chemistry related to the lanthanide containing high temperature superconducting ceramic materials were investigated.	Theoretical calculations of the electronic properties of the heaviest actinide and transactinide elements to assess relativistic effects will be emphasized. High temperature thermodynamic studies of solid compounds to determine chemical stabilities and the effects of high pressure on actinide metal and compound properties will be pursued.	Research on highly sensitive methods for speciation of solution actinide species will be increased. The chemistry of actinides in superconducting mixed oxides will be extended. New experimental and theoretical investigations on the stabilities of high temperature molecular species will be pursued.

III. CHEMICAL SCIENCES (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Chemical Sciences Research (Cont'd)	No activity.	Implementation plans for the Energy Sciences Network (ESNET) project, identified in the Applied Mathematical Sciences subprogram will proceed. This subprogram's share for the implementation of ESNET is $172.	Upgrades of ESNET to conform to the National Research and Education Network standards will continue to be pursued and will be shared among ER programs that benefit from ESNET.
Subtotal Chemical Sciences Research	$84,105	$97,137	$ 95,987
Facilities Operations	Continued support for major user facilities to meet the needs of the national user community as well as the DOE. Operational support maintained at the FY 1988 levels for facilities including the High Flux Isotope Reactor which has been shutdown to correct safety problems.	Support for major user facilities at the FY 1989 level will be maintained. Continues with restart improvements at the HFIR. Redirection of additional funds will be required to meet all restart and safety requirements.	More optimal levels of support for major user facilities will be established in FY 1990. The safety, quality assurance and physical facility improvements planned for the HFIR will be carried out. Increases for the CRF for ultra fast dynamics and theoretical computing capability will be provided. Included for the first time in this budget are funds for the highly enriched uranium needed for the HFIR fuel.
Subtotal Facilities Operations	$43,712	$43,219	$54,513
Total Chemical Sciences Operating Expenses	$127,817	$140,256	$150,500

III. CHEMICAL SCIENCES (Cont'd)

Percentage Breakdown by Performer			
Laboratory	35%	32%	33%
University	30%	30%	30%
Industrial/Other	3%	3%	3%
Facility Operations	32%	35%	34%
Subtotal	100%	100%	100%
Number of Researchers Supported	877	877	900

I. Preface: APPLIED MATHEMATICAL SCIENCES

Applied Mathematical Sciences has two activities: Mathematical Sciences Research and Energy Sciences Advanced Computation. The objectives of the Mathematical Sciences Research activity are: (1) to expand the knowledge of the fundamental mathematics and computer science principles necessary to model the complex physical phenomena involved in energy production systems and basic sciences, and (2) to explore new future computational algorithms and computer architectures necessary for investigating these mathematical models. Near term objectives include a rigorous mathematical investigation of current modeling activities in global warming, groundwater transport of pollutants, superconductivity, and complex systems. Mid-term and long-range activities include investigation of the mathematical and computer science techniques to improve the utilization of these modeling activities on the parallel computer architectures of the future. This activity includes the acquisition of new and innovative computational research computer hardware and/or software which is on the leading edge of technology. These items are subject to short acquisition lead times and therefore, it is often not possible to specifically identify each item in the budget. The primary purpose of these items is to allow the evaluation of new computer hardware and/or software approaches by the Department to determine their potential use in supporting the advanced computational operational requirements of this program.

The objective of the Energy Sciences Advanced Computation activity is to provide access to the highest quality state-of-the-art supercomputers and the software relevant to researchers supported by the Office of Energy Research.

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APPLIED MATHEMATICAL SCIENCES (Cont'd)

II. A. Summary Table

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Mathematical Sciences Research	$ 24,439	$ 24,882	$ 27,800	+ 12
Energy Sciences				
Advanced Computation	17,696	18,823	20,175	+ 7
Total Applied Mathematical Sciences	42,135	43,705	47,975	+ 10

II. B. Major Laboratory and Facility Funding

Ames Laboratory	$ 885	$ 980	$ 1,050	+ 7
Argonne National Laboratory	4,710	4,440	4,600	+ 4
Lawrence Berkeley Laboratory	1,730	1,830	2,055	+ 12
Lawrence Livermore Nat. Lab	1,500	1,475	1,750	+ 19
Los Alamos National Laboratory	1,650	2,010	2,100	+ 4
Oak Ridge National Laboratory	1,915	2,015	2,200	+ 9
Sandia Laboratories	1,235	1,555	2,025	+ 30
Supercomputer Centers	17,155	18,203	18,000	- 1

III. Activity Descriptions

APPLIED MATHEMATICAL SCIENCES

Program Activity	FY 1989	FY 1990	FY 1991
Mathematical Sciences Research	New projects in mathematics (algebraic geometry and group theory) addressing concepts in superstring theory (with joint funding from theoretical high energy physics) continue at same level as last year, as do the projects in the field of nonlinear hyperbolic conservation laws and numerical linear algebra.	The level of effort in analytical and numerical mathematics will be maintained.	Research in analytical and numerical mathematics will continue at the same level. New projects in complex nonlinear dynamical systems will be initiated. A postdoctoral fellowship in computational mathematics will be started to provide two fellowships for each major laboratory with substantial participation in the

III. APPLIED MATHEMATICAL SCIENCES (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Mathematical Sciences Research (Cont'd)			Mathematical Sciences research activity.
	Projects in data analysis, display and management techniques continue, with emphasis on new visualization techniques available on the high speed scientific workstations now available.	Projects in data analysis, display and management will be curtailed somewhat as ongoing projects finish their current funding cycle in order to provide a constant level of effort in the other categories.	Projects in data analysis, display and management will receive increased attention, in order to investigate new techniques for handling large scale scientific data on new parallel architecture computing systems.
	Research on high level languages for parallel computer systems continues at same level of effort. The large university projects at NYU, University of Illinois, and Cal Tech are being reviewed this year to assess the progress in investigating three classes of parallel architectures suitably scalable to be potential for future supercomputers.	Research projects in advanced computing concepts will be curtailed somewhat, particularly in terms of providing new computing resources and support staff in order to maintain a constant level of research effort.	Research projects that support investigation of scientific problems on parallel architecture computing systems will begin building up to critical mass in the major laboratories supported by the AMS program. Progress on adapting new algorithms to new architectures will focus on those techniques suitable to the "grand challenge" problems in physics, chemistry, biology, ecology, materials, and environmental studies.
Subtotal Mathematical Sciences Research	$24,439	$24,882	$27,800

III. APPLIED MATHEMATICAL SCIENCES (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Energy Sciences Advanced Computation	Continues support for operation of the National Magnetic Fusion Energy Computer Center at LLNL with the enhanced Class VI acquired last year. Funding continued for FSU/SCRI as directed by Congress.	Continues funding for supercomputer access to MFECC. Proceeds with the acquisition of a Class VII supercomputer to replace some of the older Class VI systems in use last year at both MFECC and FSU. Delivery of the new Class VII is anticipated late in FY 1990. Funding continued for FSU/SCRI as directed by Congress.	Continue full operation of and access to Class VII supercomputer systems by the ER research community. A Cray 2 will be released as soon as the Class VII acquisition is completed.
	Continue migration to Energy Sciences Network to replace the MFENet, which is obsolete. Total funds devoted to ESNET were $1.1 million.	Implementation plans for the Energy Sciences Network project will proceed. Total funds requested are $4.0 million, $0.5 million in the Applied Mathematical Sciences subprogram and the remainder shared among all ER research programs.	Upgrades of ESNET to conform to the National Research and Education Network standards will continue to be pursued. Total funds requested are $4.2 million, shared among all ER research programs.
Subtotal Energy Sciences Advanced Computation	$17,696	$18,823	$20,175
Total Applied Mathematical Sciences	$42,135	$43,705	$47,975

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APPLIED MATHEMATICAL SCIENCES (Cont'd)

Percentage Breakdown by Performer			
Laboratory	52%	48%	73%
University	44%	48%	21%
Other	4%	4%	6%
Subtotal	100%	100%	100%
Number of Researchers Supported	261	295	300

DOE Response to the FCCSET High Performance Computing Initiative

The report "A Research and Development Strategy for High Performance Computing" issued by the Office of Science and Technology Policy in November 1987, documents a strategy for enhancing the research base in computing and computer science and engineering supported by the Federal government in order to maintain U.S. economic competitiveness and ensure technological strength of our national defense. The implementation plan describes the role of the major funding agencies in the Federal government and proposes a plan to strengthen specific research activities and to maintain the close coordination of these activities to ensure that the U.S. industry, academia, and national laboratories are in the forefront to the design and application of modern computing systems.

Four areas of interest are described in the implementation plan:

(1) High performance computing systems, including research for future generations of computing, system design tools, advanced prototype development, and early systems for evaluation;
(2) Advanced software technology and algorithms, including support for software to address "grand challenge" problems, software components and tools, computational techniques, and advanced computing research centers;
(3) The National Research Network, including an interagency effort to produce an interim research network, research and development for a gigabit network, deployment of this new gigabit network, and structured transition to commercial service;
(4) Basic research and human resources, including enhanced support for modern mathematics and computer science departments, science and engineering educational programs to ensure an adequate supply of research talent, and strengthening of the basic research efforts in computational sciences.

DOE Activities:

The support for research and development in high performance computing is continued in the Applied Mathematical Sciences (AMS) subprogram in the Basic Energy Sciences program budget. The AMS subprogram has responsibility for most of the activities in the four categories described above for all programs in the Office of Energy Research and, with respect to basic research, for all of DOE.

I. Preface: ENGINEERING AND GEOSCIENCES

In summary the Applied Mathematical Sciences subprogram is responsive to the FCCSET High Performance Computing Initiative. DOE will continue to work closely with OSTP and the other agencies in carrying out these activities.

The Engineering and Geosciences subprogram supports DOE's central fundamental research activities in the engineering and geosciences disciplines. The engineering research objectives are (1) to improve and advance our knowledge of processes underlying current engineering practice, and (2) to expand the store of fundamental concepts for solving anticipated and unforeseen engineering problems in energy technologies. Fundamental research is supported in both traditional engineering disciplines and interdisciplinary areas. The research is concerned especially with analysis, control and improvement of systems for transport of heat and fluids and for materials processing. Because of their basic nature, the results of specific engineering research projects are expected to affect more than one energy technology. Thus, for example, successful efforts in basic multiphase flow studies will impact nuclear reactor technology, waste management, rehabilitation of the environment, tertiary oil recovery methods and renewable energy technologies. Similar wide impact is expected of heat transfer research. At the same time, advances in instrumentation and systems control are leading to innovative and improved approaches in chemical and materials processing and manufacture which will save energy and extend equipment lifetimes.

The geosciences research objective is to develop a quantitative, predictive understanding of the energy-related aspects of the earth sciences. The scope of work reflects the fact that all energy resources come from the earth and the sun and all waste products are returned to the earth and its atmosphere. The primary focus of the Geosciences program is on the geophysics and geochemistry of rock/fluid system, including emphasis on high resolution underground imaging. Other topics emphasized in the program include geochemical migration, basic geosciences studies of sedimentary formations where oil and gas are located, continental scientific drilling and isotopic studies. This research is expected to pay off in improved approaches to the recovery of oil and natural gas, solutions to problems in the isolation of hazardous wastes and environmental restorations, and advances in our knowledge of, and access to, the full range of the earth's energy resources. The earth sciences also play a key role relative to treaty verification and underground testing of nuclear weapons. The high relevance of the Geosciences program to a secure energy supply for the nation and the special expertise of the DOE laboratories in integrating basic research with technology programs are key elements in the growing recognition of the importance of geosciences research in DOE.

II. A. Summary Table

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Engineering Research.....	$ 15,152	$ 15,354	$ 15,022	- 2
Geosciences Research.....	17,618	17,850	17,478	- 2
Total, Engineering and Geosciences.....	$ 32,770	$ 33,204	$ 32,500	- 2

II. B. Major Laboratory and Facility Funding

Lawrence Berkeley Laboratory...	$ 2,587	$ 2,655	$ 2,604	- 2
Los Alamos National Laboratory.	2,775	2,656	2,608	- 2
Sandia, Albuquerque.....	2,332	1,932	1,914	- 1

III. Activity Descriptions

ENGINEERING AND GEOSCIENCES

Program Activity	FY 1989	FY 1990	FY 1991
Engineering Research	The appropriation provided for maintaining the same overall level of effort as in FY 1988. Basic research in energy related engineering offers ways for major improvements in energy systems design. New diagnostic and modeling methods for two-phase flows, for example, are replacing empirical correlations with vastly better models based on fundamental understanding of the underlying phenomena. This contributed to the resolution of a prime concern with reactor safety codes, namely the behavior of steam and water at high temperature and high pressure. Similar studies were extended to porous media which played a role in the recovery of oil and natural gas deposits, as well as in other energy systems. Research in solid mechanics lead to major progress in the ability to predict life-to-crack-initiation of structural components. Research efforts continued to address the fundamental areas of process design and control, non-destructive evaluation, instrumentation for hostile environments, and intelligent machines. With respect to the last, experiments at ORNL demonstrated	Support for basic engineering research will be maintained at a level of effort slightly below that of FY 1989. Emphasis will remain on the most critical aspects of two-phase flows and flows in porous media; in the latter case the collaboration between MIT, Sandia National Laboratory and Los Alamos National Laboratory will continue experiments aiming at the validation of advanced methods for analyzing such flows. At the same time it is expected that ongoing theoretical and experimental collaborative work at three universities will cast light on the evolution of persistent organized large scale structures in turbulent flows. Some support for attacking basic engineering problems in high temperature superconducting devices will be provided. Research will continue in the areas of combustion, welding automation and plasma processing, as will studies in solid mechanics, and the dynamics of non-linear systems and smart controls for energy systems. Investigations of novel approaches to engineering problems based on recent advances in the theory of dynamical systems, such	The request will provide continued support for long term basic engineering research in the areas of Mechanical Sciences, Control Sciences, Engineering Data and Analysis somewhat below the FY 1989 level of effort. There will be a 10% reduction in the number of graduate students supported by this subactivity. Research in multiphase flow will continue with emphasis on two-phase flow of liquids and gases and flow in porous media. These studies are not only important in many energy conversion devices but are also of importance to recovery of oil and gas deposits, management of nuclear waste repositories, and the Department's long-term environmental restoration program. Research in non-linear dynamical systems will be continued with slightly diminished support for experts in theory of chaos and non-linear dynamical systems drawn from such fields as engineering, mathematics, physics, chemistry, biology, and economics. Such theory is needed to model and study the evolution of engineering, physical,

III. ENGINEERING AND GEOSCIENCES (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Engineering Research (Cont'd)	modes of operation in which two independent machines acting jointly under limited human supervision carry out a set of requested tasks. Studies carried out in the University-INEL collaborative project included developing efficient control strategies for automated welding processes, and the development of optical techniques for plasma diagnostics and process control. Further studies continued to address the fundamental engineering aspects of combustion and methods for acquisition of thermophysical data for energy related processes. Systems using the new superconductors were studied by, for example, use of non-destructive evaluation techniques to see changes associated with transformations to the superconducting state.	as new efficient energy conversion cycles made possible by resonances between coupled oscillatory chemical reactions and mechanical process, will continue. This subactivity will continue to stimulate wide collaboration between national labs and universities in appropriate areas of interest.	biological, and economic systems. Existing, strong collaborative work among universities, industries and national laboratories will be continued in such diverse areas as welding automation, plasma processing, combustion, intelligent machines, structural life prediction, etc. Due to the overall decrease in the level of effort, the flow of research results for practical industrial applications will be somewhat diminished.
	No activity.	Implementation plans for the Energy Sciences Network (ESNET) project, identified in the Applied Mathematical Sciences subprogram will proceed. This activity's share for the implementation of ESNET is $20.	Upgrades of ESNET to conform to the National Research and Education Network standards will continue to be pursued and will be shared among ER programs that benefit from ESNET.
Subtotal Engineering Research	$15,152	$15,354	$15,022
Geosciences Research	A major effort was initiated to improve remote high-resolution, three-dimensional mapping	Continued funding will be provided for high resolution underground imaging of geologic media using	Continued emphasis will be given to the geological approaches which best illuminate the spatial relations of

III. ENGINEERING AND GEOSCIENCES (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Geosciences Research (Cont'd)	capabilities using elastic waves (i.e., acoustic and shear waves) for underground imaging. Techniques for high data-rate processing and large array synthesis were developed and applied to advance the state-of-the-art. This research seeked to provide the increased resolution necessary to define geologic discontinuities with an accuracy suitable for application to the requirements of waste isolation and hydrocarbon reservoir studies. In addition, other lines of research were in progress related to sedimentary basins which contain oil and gas resources. Rates of conversion of kerogen to petroleum, rock mechanics, fluid-rock interactions, geochemical transport, and isotopic tracer studies are major components of this effort. Thermodynamic properties of melts, brines, and other fluids comprised an important part of geochemical research this year. Results of these studies were applied to a better understanding of thermal regimes and the evolution of sedimentary basins. In the area of continental scientific drilling, a drill hole in the Valles Caldera, New Mexico, was completed early in FY 1989 to 1.7 km, about 200m into the conductive zone of an active hydrothermal system.	elastic waves. New techniques for high data-rate processing, large array synthesis and the interpretation of seismic data in terms of geologic media parameters such as permeability will be part of this effort. Because of its application to DOE interests in radioactive and hazardous waste disposal, hydrocarbon reservoir studies, and geologic media in general, underground imaging is expected to play a key role in the Geosciences Research activity, and funding for this effort will be maintained in FY 1990. An appropriate balance of research in other areas of the geosciences will be continued. Research related to sedimentary formations in which oil and gas resources are located will be emphasized. Research in regions of high heat flows (thermal regimes) will aid in better understanding of the heat sources responsible for the maturation of hydrocarbon-bearing sediments and for geothermal energy resources. Other research topics receiving emphasis will include geochemical migration, permeability studies, isotopic tracer studies, fluid flow, and solar-terrestrial-atmospheric interactions. Continental scientific drilling	crustal rocks and fluid flow in the crust, to research on high-resolution geophysical imaging, permeability studies, rock/fluid interactions, isotopic tracer studies, and scientific drilling. Because predictions of fluid flow in situ are so often unsatisfactory, numerical modeling studies will be needed to explore the connections and sources of error in fluid flow results obtained from laboratory and field scale experiments. New theoretical approaches for predicting fluid flow in heterogeneous media will be explored. Basic studies will be maintained dealing with oil, gas, and water reservoirs, including causes and distributions of permeability of reservoir rocks, rock fracture properties, and rock stress states. Studies of solar-terrestrial atmospheric interactions and appropriate solid earth studies will be pursued. The environmental impact statement for the Katmai (Alaska) scientific drilling project will be completed in preparation for drilling, which is targeted for 1992. Additional field investigations will also be completed at Katmai in 1991.

III. ENGINEERING AND GEOSCIENCES (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Geosciences Research (Cont'd)	Geophysical surveys of the proposed drill site at Katmai in Alaska were carried out. Solar-terrestrial physics research concentrated on the relationship between the near-space environment of the earth and the upper and middle atmosphere.	research will be maintained, particularly at Katmai in Alaska.	
	No activity.	Implementation plans for the Energy Sciences Network (ESNET) project, identified in the Applied Mathematical Sciences subprogram will proceed. This activity's share for the implementation of ESNET is $20.	Upgrades of ESNET to conform to the National Research and Education Network standards will continue to be pursued and will be shared among ER programs that benefit from ESNET.
Subtotal Geosciences Research	$17,618	$17,850	$17,478
Total Engineering and Geosciences Operating Expenses	$32,770	$33,204	$32,500
Percentage Breakdown by Performer			
Laboratory	49%	49%	48%
University	45%	45%	45%
Industrial/Other	6%	6%	7%
Subtotal	100%	100%	100%
Number of Researchers Supported	401	392	375

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I. Preface: ADVANCED ENERGY PROJECTS

The objective of the Advanced Energy Projects (AEP) subprogram is to explore the feasibility of novel, energy-related concepts, as they evolve from basic research. Such concepts are at an early stage of scientific definition and, therefore, would not qualify for support by technology programs. Because they are new and untried, those concepts invariably represent high risk. To qualify for AEP support, the concepts must also have a potential payoff of a magnitude sufficient to open new vistas for the Nation's energy posture. Projects such as the exploration of new approaches to controlled fusion and of unconventional applications for superconducting materials can lead to dramatic energy-related implementations. Major consideration is given to facilitate a transfer of successful AEP projects to the proper technology program, whether in the Government or in the private sector. Transfers are effected every year, with several leading to major development programs.

The principal mode of operation for this interdisciplinary subprogram is to support individual projects for a limited time only. It differs from other subprograms in that ongoing evolutionary research is not funded. The spectrum of projects supported is very broad and encompasses the range of the Department's non-defense interests. Close contact is maintained with other DOE technology programs to ensure proper coordination. Projects are selected on the basis of unsolicited proposals received from researchers at universities, industrial laboratories (especially small R&D companies) and national laboratories.

A separate activity within AEP is the Heavy Ion Fusion Accelerator Research (HIFAR) program. HIFAR conducts research and development on the heavy-ion, induction linear accelerator method to assess its suitability as a "driver" for electric power plants based on the principle of inertial confinement fusion. In this approach to fusion, output from the driver is used to compress small pellets of fuel to the extent that energy-producing thermonuclear reactions occur. (The other inertial fusion driver contenders, lasers and light-ion accelerators, are being developed elsewhere within DOE.)

II. A. Summary Table

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Advanced Energy Projects.....	$ 14,358	$ 14,591	$ 24,000	+ 64
Total, Advanced Energy Projects.....	$ 14,358	$ 14,591	$ 24,000	+ 64

II. B. Major Laboratory and Facility Funding

Lawrence Berkeley Laboratory...	$ 5,014	$ 4,860	$ 4,800	- 1
Los Alamos National Laboratory.	2,061	1,193	1,200	0

III. Activity Descriptions

ADVANCED ENERGY PROJECTS

Program Activity	FY 1989	FY 1990	FY 1991
Advanced Energy Projects	As is the case every year, new highly nonconventional energy-related concepts, as they emerge, were explored for their technical feasibility. Continued emphasis was on concepts for very bright laser-type x-ray sources and their applications, especially in the area of x-ray laser holography and microscopy, for imaging of living matter at subcellular levels; the work was coordinated with the Biological and Environmental Research program. Muon-catalyzed fusion was further explored for its potential as an alternative to other fusion schemes. The Heavy Ion Fusion Accelerator Research program was continued to complete and document existing major research activities within the program; emphasis was placed on maximizing the scientific return on the sizable investment in the existing HIFAR experimental apparatus.	Funds will be used to support exploratory research on innovative energy-related concepts which evolve from basic research but are in need of proving their practical feasibility. As has been the case for over a decade, all projects are supported for a limited period of time, in most cases not exceeding three years. Subjects studied by researchers at universities, national laboratories, and industrial laboratories span the full spectrum of Departmental non-defense interests and presently include areas such as unconventional approaches to superconductor development, entirely new approaches to chemical separations, new sources of coherent electromagnetic radiation, including x-ray lasers, applications of such sources to microscopic imaging of live matter at subcellular levels, and muon-catalyzed fusion or "cold-fusion"-- an approach to fusion energy generation that does not require high temperatures. The Heavy Ion Fusion Accelerator Research (HIFAR) effort will continue towards an understanding of key beam physics and accelerator technology issues	Provides funds to continue with the mission to establish the technical feasibility of novel and highly unconventional concepts that span the Department's interests in energy technologies, as they emerge from basic studies. Projects currently underway at universities, national laboratories and industrial laboratories will be continued towards completion. These projects are in areas that include novel sources of short-wavelength radiation, unconventional approaches to chemical separations, innovative fossil fuel technology, and alternative approaches to fusion. As existing projects are completed, promising new concepts can be considered for support. Program vitality will be maintained by initiating approximately 10 new projects during the fiscal year. The Heavy Ion Fusion Accelerator Research (HIFAR) effort will continue towards its objective with existing apparatus. Emphasis will be placed on using the ion injector system to examine the physics issues associated with the transition from low to medium beam energies in a driver.

III. ADVANCED ENERGY PROJECTS (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Advanced Energy Projects (Cont'd)		through the comprehensive utilization of existing apparatus. The injector system will be used to probe the parameter space of physics associated with transporting very high-current beams of heavy ions.	Provides funds to rapidly transfer synchrotron x-ray source technology from DOE laboratories to the semiconductor industry. This technology is the cornerstone of a promising technique, called x-ray lithography, for mass producing the next generation of computer chips. Although DOE laboratories are among the world leaders in developing research-quality synchrotron rings, US industry lacks the expertise to expeditiously adapt this technology for manufacturing semiconductor devices on a commercial scale. This initiative will be closely coordinated with the Department of Defense as each Department has a strong programmatic interest in the mass production of advanced computer chips. This activity is proposed to be 50/50 cost shared with industry.
	No activity.	Implementation plans for the Energy Sciences Network (ESNET) project, identified in the Applied Mathematical Sciences subprogram will proceed. This subprogram's share for the implementation of ESNET is $20.	Upgrades of ESNET to confore to the National Research and Education Network standards will continue to be pursued and will be shared among ER programs that benefit from ESNET.
Total Advanced Energy Projects Operating Expenses	$14,358	$14,591	$24,000

ADVANCED ENERGY PROJECTS (Cont'd)

Percentage Breakdown by Performer

Laboratory	70%	70%	41%
University	19%	19%	11%
Industrial/Other	11%	11%	48%
Subtotal	100%	100%	100%
Number of Researchers Supported	145	145	150

I. Preface: ENERGY BIOSCIENCES

In the near future, biomass, a renewable resource, will assume an increasingly important role with respect to providing fuels, chemicals, and new materials as replacements for currently used fossil reserves. The research focus of the Energy Biosciences (EB) subprogram is to understand the fundamental mechanisms of how plants produce biomass and the mechanisms of biological transformation of crude, abundant biomass into other usable forms. The program provides the basic foundation for the broad exploitation of new sophisticated knowledge in molecular genetics. Currently, a major obstacle to the employment of exceedingly powerful molecular biological technology is the meager biological information base for defining new processes and applications. The EB subprogram is designed to fill this critical information gap by the support of research in the plant and microbiological sciences. A principal thrust is to develop, in the broadest way possible, understanding at the genetic, biochemical and physiological levels of the diverse capabilities of organisms to metabolically synthesize chemical compounds. Included in this thrust is generation of a thorough understanding of the mechanisms available to organisms for the conversion of noxious or undesirable materials into less threatening species. Such information could be used in designing new clean-up biotechnologies. The EB subprogram specifically focuses on major classes of plant compounds such as carbohydrates and lignins, in terms of how they are produced, how they are degraded, and what opportunities exist for their biological modification. Many of the research areas covered by the EB subprogram have been neglected over the years. Applications to energy problems would be expected in the mid- to long-term time scale. The program is unique in the federal government; its major focus is on the potential biological solution of energy problems addressed at the fundamental level. These include photosynthesis, methanogenesis, fermentations, genetics of anaerobic organisms and others. The program interacts and coordinates with the Conservation and Renewable Energy program in DOE as well as USDA and NSF programs and is participating with those agencies in a three agency program to support plant science centers. Where feasible, interactions with industry are promoted.

II. A. Summary Table

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Energy Biosciences.....	$ 20,374	$ 20,674	$ 20,200	- 2
Total, Energy Biosciences....	$ 20,374	$ 20,674	$ 20,200	- 2

ENERGY BIOSCIENCES (Cont'd)

II. B. Major Laboratory and Facility Funding

Brookhaven National Laboratory.	$ 1,145	$ 970	$ 925	- 5
Lawrence Berkeley Laboratory...	1,253	1,100	1,101	0
Michigan State University.....	2,510	2,550	2,600	+ 2

III. Activity Descriptions

ENERGY BIOSCIENCES

Program Activity	FY 1989	FY 1990	FY 1991
Energy Biosciences	This level allowed continuation of the base program in plant and microbial sciences with internal adjustments of the program based on the turnover of projects. Some additional activity in plant biochemistry related to the mechanisms and regulation of the synthesis of lignin and plant and microbial polysaccharides was done with funds redirected from other research areas. Research activities on the biological modification of materials sponsored jointly with the Division of Materials Science was modestly increased. The multidisciplinary plant science center research activities initiated in FY 1987 on complex carbohydrates and in FY 1988 on the early events involved in photosynthesis continued to be supported. Congressional direction to support programs at the Oregon Graduate Center continued.	Efforts will be made to focus new projects in the areas of carbohydrate and lignin structure function synthesis and biodegradation. Ongoing research in these areas will, for the most part continue. The three agency (NSF-DOE-USDA) multidiciplinary plant science research centers begun in previous years at the University of Georgia and Arizona State University will be maintained. Congressional direction to support a program at the Oregon Graduate Center continues.	This is an essentially level budget for the Energy Biosciences subprogram in the plant and microbial sciences. It allows maintenance of strong projects and initiation of a few projects strictly dependent on the termination of others. The three agency (USDA-DOE-NSF) Plant Science Centers currently underway will continue to be supported.

III. ENERGY BIOSCIENCES (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Energy Biosciences (Cont'd)	No activity	Implementation plans for the Energy Sciences Network (ESNET) project identified in the Applied Mathematical Sciences subprogram will proceed. This subprogram's share for the implementation of ESNET is $25.	Upgrades of ESNET to conform to the National Research and Education Network standards will continue to be pursued and will be shared among ER programs that benefit from ESNET.
Total Energy Biosciences Operating Expenses	$20,374	$20,674	$20,200
Percentage Breakdown to Performer			
Laboratory	16%	16%	16%
University	82%	82%	82%
Industrial/Other	2%	2%	2%
Subtotal	100%	100%	100%
Number of Researchers Supported	195	195	195

I. Preface: PROGRAM DIRECTION

This subprogram provides the Federal staffing resources and associated funding required to develop, direct, and administer a complex and broadly diversified program for mission-oriented research to provide the fundamental scientific and engineering base on which the Nation's future energy, defense, and technology options depend. This staff supports basic research which helps us attain our national goals, i.e., better health and quality of life, economic competitiveness, energy self-sufficiency, and national security.

PROGRAM DIRECTION (Cont'd)

II. A. Summary Table

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Program Direction.....	$ 4,900	$ 5,374	$ 6,500	+ 21
Total, Program Direction...	$ 4,900	$ 5,374	$ 6,500	+ 21

III. Activity Descriptions

PROGRAM DIRECTION

Program Activity	FY 1989	FY 1990	FY 1991
Program Direction	Provided funds for salaries, benefits, and travel for 64 full-time equivalents (FTE's) in the Office of Basic Energy Sciences, the Scientific Computing Staff, and related program and management support staff. Ongoing activities include assessing the scientific needs and priorities of the program; planning to meet those needs; technical review of proposals from laboratories and universities; and monitoring the progress of ongoing university contracts, laboratory programs, and construction projects; as well as responding to the many day-to-day requirements involving budget, procurement and other management support activities. Provided staff support for basic research, R&D and	Provide funds for salaries, benefits, and travel for 63 FTE's included in the FY 1990 budget including normal increased personnel costs. A revised request for seven additional FTE's follows. Four of the additional FTE's are required by line management for increased activities to ensure compliance with ES&H directives and regulations at numerous research facilities and to manage other programmatic workloads. Appraise contractor ES&H performance and ensure safe disposal of spent fuels and other byproducts and wastes. Manage increased user facilities construction, such as the 6-7 GeV project, and operation and increasing workloads in basic research programs in such areas as hydrocarbon, plant	Provide funds for salaries, benefits, and travel related to 70 FTE's. The increased funding will provide for seven additional FTE's over the FY 1990 budget level as discussed in FY 1990. Will also provide for normal increased personnel costs resulting, for example, from within-grade and merit increases and the impact of the FY 1990 general and executive pay raises. Continue to support National research goals supporting the country's energy-related technology foundation. In addition to enhanced support for ES&H and facilities R&D and construction, the additional staff will provide increased management oversight to maintain technical excellence in R&D in such areas as superconductivity, molecular

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III. PROGRAM DIRECTION (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Program Direction (Cont'd)	facilities needed to continue U.S. leadership in key scientific areas and for numerous university construction projects. Addressed escalating environment, safety and health (ES&H) issues as they pertained to current and planned program facilities including two Class A reactors at Brookhaven and Oak Ridge National Laboratories and a new multimillion dollar research reactor still in the R&D phase; supported the Basic Energy Sciences Advisory Committee; and provided liaison with industry in such areas as superconductivity, semiconductors, and oil and gas geosciences. Also managed the DOE-wide SBIR program and the Magnetic Fusion Energy Computer Network. ($4,168)	chemical processes and semiconductor research. Three additional FTE's are also required to enhance the Office of Energy Research's independent ES&H oversight capability to provide support for responsibilities involving nuclear safety, health physics, occupational safety and industrial hygiene, environmental protection, hazardous waste management, safeguards and security, emergency preparedness, and quality assurance. Staff will perform safety appraisals, environmental compliance audits, and oversee interagency agreements. ($4,844)	supporting oil and gas and coal chemistry. Staff will continue to manage preconstruction R&D and construction of advanced scientific facilities and support numerous current user facilities. Interact significantly with other agencies on National efforts such as superconductivity and supercomputing. Continue to support projects maintaining scientific excellence which are relevant to DOE's long-term goals and help maintain world leadership in science and technology. ($5,955)
	Provided a variety of program support such as electronic information and communications services, printing and binding, and contractual services, for example, for the SBIR program and to assist with the environment, safety and health workload required by current regulations and directives. ($732)	Continue the variety of program support required in FY 1989. ($530)	Continue the variety of program support required in FY 1990. ($545)
Total, Program Direction	$4,900	$5,374	$6,500

I. Preface: CAPITAL EQUIPMENT

Capital equipment is needed to support the research in each of the subprograms in the Basic Energy Sciences program. In addition, Argonne and Ames are funded for general purpose equipment through BES for the purpose of providing all the DOE programs at ANL and Ames and with this type of equipment. Studies done both by the Department and by the laboratories continue to stress the importance of modernization in order to take advantage of technologically more efficient and safe instruments and equipment. Much of the research in the BES program involves experiments at extremes of temperature and pressure and requires unprecedented levels of resolution. Reliable, precise measurements under such conditions challenge the current state-of-the-art, and as improvements are made in instruments and equipment, it is important to benefit from them in a timely fashion. The quality of individual research projects and effective experiments at the major facilities depends on the availability of new state-of-the-art equipment and instrumentation, and on replacement of older, obsolete equipment.

II. A. Summary Table

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Capital Equipment.....	$ 31,700	$ 36,486	$ 37,019	+ 1

III. Activity Descriptions

CAPITAL EQUIPMENT

Program Activity	FY 1989	FY 1990	FY 1991
Capital Equipment	Equipment needs were accommodated at the FY 1988 level. Replacement and acquisition of new equipment continued to ensure that optimum research results were obtained and properly analyzed. General purpose equipment requirements for Ames and ANL were met.	Equipment needs will be accommodated at the FY 1989 level. Replacement and acquisition of new equipment will continue to ensure that optimum research results can be obtained and properly analyzed. General purpose equipment requirements for Ames and ANL will continue to be met. Special equipment needs in Materials Sciences in superconductivity and semiconductor research areas will	Equipment needs will be accommodated at the current level. Replacement and acquisition of new equipment required will continue to ensure that optimum research results can be obtained and properly analyzed. General purpose equipment requirements for Ames and ANL will continue to be met.

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III. CAPITAL EQUIPMENT (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Capital Equipment (Cont'd)		receive a small but needed increase. In addition, equipment necessary to expand research in molecular sciences is provided.	
Total, Capital Equipment	$31,700	$36,486	$37,019

I. Preface: CONSTRUCTION

Construction is needed to support the research in each of the subprograms in the Basic Energy Sciences program. Experiments necessary in support of basic research require that new state-of-the-art facilities be built and modified to meet unique research requirements. Reactors, radiation sources, and neutron sources are among the expensive, but necessary, facilities required. The budget for the BES program includes funding for the construction and modification of these facilities.

II. A. Summary Table

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Construction	$ 86,621	$ 76,833	$108,034	+ 41

III. Activity Descriptions

CONSTRUCTION

Program Activity	FY 1989	FY 1990	FY 1991
Construction	Continues all projects under way in FY 1988 and makes provision for the start of design for the 6-7 GeV Synchrotron Radiation Source at ANL. Includes funding for several Congressionally- mandated projects.	Continues funding for AIP, GPP, 1-2 GeV, the 3 GeV Injector and the 6-7 GeV projects. The funding level in FY 1990 is less than the FY 1989 level because no provision is made for continuing funding for Congressionally-mandated university projects and funding for the LANSCE facility is completed in FY 1989.	Continues all projects underway in FY 1990, except for the 3 GeV which was completed.
Total Construction	$86,621	$76,833	$108,034

I. Preface: SUMMARY OF MAJOR USER FACILITIES

The major facilities discussed below are used to conduct forefront research in materials, chemistry, biology, medicine, semiconductors and in both the applied and basic sciences using lasers and high fluxes of neutrons or photons. These facilities are unique in their ability to probe the structure and properties of important energy related phenomena. In view of the expensive and unique character of these facilities, researchers from all parts of the Nation travel to these facilities to conduct their research, including researchers from government laboratories, industry and universities, in addition to DOE contractors. In addition to currently operating facilities, recommendations from national committees and DOE committees have identified needs for advanced facilities in order to continue to conduct leading edge research. The Department is requesting construction and research and development in FY 1991 for two advanced scientific facilities (1-2 GeV Synchrotron Light Source and the 6-7 GeV Synchrotron Radiation Source).

Summarized below is a list of each of these facilities, as well as a description of the activities underway in FY 1989, FY 1990 and FY 1991 to provide for their operation and maintenance. Funding for these facilities is included as part of the budget request in the Materials Sciences and Chemical Sciences subprograms.

SUMMARY OF MAJOR USER FACILITIES (Cont'd)

II. Summary Table

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
National Synchrotron Light Source	$ 19,324	$ 20,119	$23,766	+ 18
High Flux Beam Reactor	14,565	14,749	23,500	+ 59
Intense Pulsed Neutron Source	5,122	5,360	6,489	+ 21
High Flux Isotope Reactor	18,977	17,920	24,441	+ 36
Radiochemical Engineering Development Center	7,113	6,850	6,850	0
Stanford Synchrotron Radiation Laboratory	10,152	10,437	13,981	+ 34
Manuel Lujan, Jr. Neutron Scattering Center	4,800	4,437	5,700	+ 28
Combustion Research Facility	3,475	3,619	4,475	+ 24
Advanced Scientific Facilities				
1-2 GeV	1,873	5,548	10,891	+ 96
6-7 GeV	5,822	9,441	14,852	+ 57
Total Operating Expenses	$ 91,223	$ 98,480	$ 134,945	+ 37

THE NATIONAL SYNCHROTRON LIGHT SOURCE (NSLS), BROOKHAVEN NATIONAL LABORATORY

The National Synchrotron Light Source is a unique user oriented facility for advanced research with synchrotron radiation. At NSLS a wide range of research techniques are used by biologists, chemists, solid state physicists, metallurgists, and engineers for basic and applied studies. This is a forefront dedicated facility which is used for vacuum ultra-violet and X-ray scattering and spectroscopy. The facility will be fully utilized in FY 1990.

Program Activity	FY 1989	FY 1990	FY 1991
NSLS	Continued full year operations with increase needed to accommodate user support.	Continue full year of operations.	Continue full year of operations with increase needed to accommodate user support and fully utilize facility.
Subtotal NSLS Operating	$19,324	$20,119	$23,766

III. SUMMARY OF USER MAJOR FACILITIES (Cont'd)

THE HIGH FLUX BEAM REACTOR (HFBR), BROOKHAVEN NATIONAL LABORATORY

The High Flux Beam Reactor produces high flux neutron beams used for research in a variety of fields. Neutrons are used as probes by nuclear and solid-state physicists, chemists, and biologists. This 20 year old research reactor has been a pacesetting facility and remains fully utilized and productive. About 200 users were involved in FY 1988. The scientific activity will continue at a constant level of effort during the next 2 years.

Program Activity	FY 1989	FY 1990	FY 1991
HFBR	Continued support with reduced number of operating cycles in order to accommodate completion of safety assessments identified by the NAS. The full extent of the safety improvements identified by the NAS are currently being determined.	Restores operation and accommodates increased costs of safety and heavy water requirements at the reactor. The full extent of the safety improvements identified by the NAS are currently being determined.	Continues full operation, safety improvements implemented. Funds are provided for uranium conversion, enrichment costs, and heavy water costs at HFBR.
Subtotal HFBR Operating	$14,565	$14,749	$23,500

THE INTENSE PULSED NUETRON SOURCE (IPNS), ARGONNE NATIONAL LABORATORY

The Intense Pulsed Neutron Source is a dedicated user facility for advanced research with pulsed neutrons serving the physics, materials, chemical, and life sciences research communities. It is fully utilized to the extent available. About 180 users were involved in FY 1988. With the planned improvements of the proton target source of neutrons and some of the spectrometers, the scientific activity at this facility will increase moderately during the next 2 years.

Program Activity	FY 1988	FY 1990	FY 1991
IPNS	Continued at FY 1988 level of operations for users.	Increases user support and operations above the FY 1988 level.	Continues full operation.
Subtotal IPNS Operating	$5,122	$5,360	$8,489

III. SUMMARY OF USER MAJOR FACILITIES (Cont'd)

THE HIGH FLUX ISOTOPE REACTOR (HFIR) AND RADIOCHEMICAL ENGINEERING DEVELOPMENT CENTER (REDC), OAK RIDGE NATIONAL LABORATORY

The High Flux Isotope Reactor is a multipurpose reactor which is used for the production of isotopes, and also used for materials sciences, nuclear chemistry, and radiation damage research. The isotopes are important to the research, medical, and industrial community. Many of these isotopes can only be produced at the HFIR reactor. When fully utilized about 150 users are involved with research at the facility. Currently, safety considerations have caused the reactor to remain down. The current DOE plan is to restart the reactor after it is determined that the reactor can be safely operated and necessary improvements in plant and personnel have been made. This includes the hiring of additional staff, modifications to the reactor, and additional training of the reactor staff. The Radiochemical Engineering Development Center, formerly the Transuranium Processing Plant, is a companion facility to the HFIR and was built to recover the transuranium elements from irradiated targets from the reactor. The combined operating costs of these facilities are shown below.

Program Activity	FY 1989	FY 1990	FY 1991
HFIR and REDC	REDC and HFIR facility improvements continued in order to address safety requirements necessary prior to the restart of the reactor.	REDC and HFIR facility improvements will proceed on a 12 month schedule. HFIR will be restarted to provide full services to users with safety upgrades mentioned above continued.	HFIR will operate 12 months and provide full services to users with safety, quality assurance and physical facility improvements proceeding as planned. REDC operations and improvements will be carried out for a full 12 months. Funds are provided for the highly enriched uranium needed for the HFIR fuel.
Subtotal HFIR/REDC Operating	$26,090	$24,770	$31,291

THE STANFORD SYNCHROTRON RADIATION LABORATORY (SSRL), STANFORD UNIVERSITY

The Stanford Synchrotron Radiation Laboratory is a national facility funded to permit the utilization of synchrotron radiation for basic and applied research in chemistry, physics, biology, and materials sciences. The operation of this facility is dependent on the operation of the High Energy Physics electron injector. When fully utilized about 500 users are involved in research at the facility. With some new beamlines being commissioned, increased scientific activity is expected. Construction of a separate 3 GeV electron injector for the SPEAR Ring will continue in FY 1990.

III. SUMMARY OF MAJOR USER FACILITIES (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
SSRL	SSRL operations continued at approximately the same level as in FY 1988.	Operation of SSRL and PEP will be continued.	Full operations of SSRL as dedicated synchrotron facility with 3 GeV injector.
Subtotal SSRL Operating	$10,152	$10,437	$13,981

MANUEL LUJAN, JR. NEUTRON SCATTERING CENTER, LOS ALAMOS NATIONAL LABORATORY

The Manuel Lujan, Jr. Neutron Scattering Center is a dedicated user facility for advanced research with the nation's most intense pulsed neutrons serving the physics, materials, chemical, and life sciences research communities. The operation of this facility utilizes the Los Alamos proton storage ring facility and is budgeted by Defense Programs. Construction of a new experimental hall at the Center continued in FY 1988 and was completed in FY 1988. With the new experimental hall, the scientific program activity will involve, by FY 1991, nearly 100 materials and materials-related scientists.

Program Activity	FY 1989	FY 1990	FY 1991
Manuel Lujan, Jr. Neutron Scattering Center	Increased operations funding for user support.	Continues operations and user support at the FY 1989 level.	Increased funding for operations and user support.
Subtotal Operating	$4,800	$4,437	$5,700

COMBUSTION RESEARCH FACILITY (CRF), SANDIA NATIONAL LABORATORY

The Combustion Research Facility provides a unique capability to outside users from industry, university, and laboratory scientists for combustion research. The focus of the laboratory is on laser diagnostics of combustion systems, but a variety of burner systems and special facilities are available, including those for research on coal combustion and internal combustion engines. About 30 experiments involving about 50 scientists were operational in FY 1989. About one new experimental capability will be added each year for the next several years.

III. SUMMARY OF MAJOR USER FACILITIES (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
CRF	Provided for needed increase in operations and user support over the FY 1988 level.	Operations will continue at the FY 1989 level.	The postdoctoral and visiting scientist program will be enhanced to facilitate "technology transfer." Shorter time laser pulses and enhanced computer capability will be available to users for advanced studies in dynamics.
Subtotal CRF Operating	$3,475	$3,619	$4,475

ADVANCED SCIENTIFIC FACILITIES

Funding in FY 1991 is requested to continue research and development activities associated with the two major scientific facilities proposed for construction in the program. These facilities are the 1-2 GeV Synchrotron Light Source (LBL) and the 6-7 GeV Synchrotron Radiation Source (ANL). Preconstruction R&D funds are requested to resolve technical uncertainties prior to and early in the actual construction of the facilities. In the case of the 1-2 GeV, construction is underway and the R&D funds for this project are focused on improvements to the magnet lattice and related activities. For the 6-7 GeV Source, significant R&D activities are necessary due to the overall size and complexity of the project. Research activities at the 6-7 GeV will be focused on prototypes of the dipole magnets and insertion devices.

Program Activity	FY 1989	FY 1990	FY 1991
Advanced Scientific Facilities	R&D funding for advanced scientific facilities continued.	Provides support for needed R&D for the 1-2 GeV and 6-7 GeV light sources. The increase in FY 1990 is required to begin to hire additional staff to ready the 1-2 GeV for operation and to meet the R&D schedule for the 6-7 GeV light source.	Provides for necessary increase to fully support R&D of the 1-2 and 6-7 GeV light sources. The increase provided helps ensure that the necessary R&D is completed to maintain the schedule and cost of these projects.
Subtotal Advanced Scientific Facilities Operating	$7,695	$14,989	$25,743

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Basic Energy Sciences

IV. Construction Project Summary

Project No.	Project Title	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Unappropriated Balance	TEC
91-E-314	Accelerator Improvements Projects	2,300	4,536	6,965	0	6,965
GPE-400	General Plant Projects	3,221	2,784	3,069	0	3,069
89-R-402	6-7 GeV Synchrotron Radiation Source	6,000	39,440	75,000	335,000	456,000
88-R-403	3 GeV Spear Injector	9,500	4,437	0	0	13,937
87-R-406	1-2 GeV Sychrotron Radiation Source	44,500	25,636	23,000	6,000	99,500
Total, Basic Energy Sciences Construction		XXX	76,833	108,034	341,000	XXX

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Basic Energy Sciences

IV. B. Plant Funded Construction Project

1. Project title and location: 91-E-314 Accelerator and reactor improvements and modifications, various locations

Project TEC: $ 6,965
Start Date: 2nd Qtr. FY 1991
Completion Date: 3rd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriated	Obligations	Costs
1991	$ 6,965	$ 6,965	$ 4,000
1992	0	0	2,000
1993	0	0	965

3. Narrative:

(a) This project provides for additions and modifications to accelerator and reactor facilities, which are supported by the Basic Energy Sciences program. Since program priorities and needs change, the projects described below indicate the most likely projects to be funded. A continuing evaluation, however, is necessary to ensure that those projects with the greatest productivity are funded. Two projects at the Brookhaven National Laboratory are requested to incorporate improvements at the High Flux Beam Reactor and the National Synchrotron Light Source, one project is requested for facility improvements at the Stanford Synchrotron Radiation Laboratory, one project is requested at the Oak Ridge National Laboratory for improvements to the High Flux Isotope Reactor, and one project is requested for facility improvements at the University of Notre Dame, Radiation Laboratory.

(b) The following are the projected items of work to be performed at the various locations. Since needs and priorities may change, other projects may be substituted for the examples listed below, and some of these may be located on non-Government owned property.

National Synchrotron Light Source
Component hardware replacements and additions to achieve improved orbit stability by elimination of noise sources and to provide active feedback systems.

High Flux Beam Reactor
New state-of-the-art instrumentation to provide improved reliability and maintainability, such as control rod position indicators, primary system instrumentation, and on-line secondary water tritium monitors.

Stanford Synchrotron Radiation Laboratory
Provide for improvements to the Stanford Synchrotron Radiation Laboratory necessary to meet changing research activities underway. Modifications to beam lines, enhanced monitoring, and evaluation equipment are among the types of improvements necessary at this laboratory.

High Flux Isotope Reactor

Provide for necessary safety improvements identified for the High Flux Isotope Reactor (HFIR) facilities and systems such as the confinement system, ventilation systems, confinement building, and auxiliary buildings.

Radiation Laboratory, University of Notre Dame

Provide for improvements in the Linear Accelerator Facility by augmenting the present accelerator with a technologically superior accelerator with substantially higher beam dosage, substantially better beam stability and reproducibility, and improved time resolution.

4. Total Project Funding (BA):

	FY 1991 Request
Construction	$ 6,985

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Basic Energy Sciences

IV. B. Plant Funded Construction Project

1. Project title and location: GPE-400 General plant projects

Project TEC: $ 3,089
Start Date: 1st Qtr. FY 1991
Completion Date: 4th Qtr. FY 1992

2. Financial schedule:

Fiscal Year	Obligations	Costs FY 1989	FY 1990	FY 1991	After FY 1991
Prior Year Projects	4,900	2,887	0	0	0
FY 1989 Projects	3,221	1,671	1,550	0	0
FY 1990 Projects	2,784	0	1,400	1,384	0
FY 1991 Projects	3,089	0	0	739	2,330

3. Narrative:

(a) This project is required to provide for minor new construction, other capital alterations and additions, and for buildings and utility systems. Where applicable, the request also includes the cost of installed capital equipment integral to a subproject. Funding of this type is essential for maintaining the productivity and usefulness of Department-owned facilities. Since it is difficult to detail this type of project in advance, a continuing evaluation of requirements and priorities may be expected to result in additions, deletions, and changes in the currently planned subproject.

(b) The currently estimated distribution of FY 1989 funds by office is as follows:

Ames Laboratory	$ 648
Argonne National Laboratory	1,671
Notre Dame Radiation Laboratory	50
Sandia National Laboratories	350
Stanford Synchrotron Radiation Laboratory	350
Total project cost	$ 3,089

FY 1991 General Plant Projects (GPP) are miscellaneous minor new construction projects of a general nature. The total estimated costs of each will not exceed $1,200,000. These projects are necessary to provide for the continuing requirement to maintain the facilities in a good state of repair, to adapt the facilities to new or improved production or service techniques, to effect economics of operations and to reduce or eliminate health, fire, and security problems.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request
Construction	$ 4,900	$ 3,221	$ 2,823	$ 3,089

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Basic Energy Sciences

IV. B. Plant Funded Construction Project

1. Project title and location: 89-R-402 6-7 GeV Synchrotron Radiation Source
Argonne National Laboratory,
Argonne, Illinios

Project TEC: $ 456,000
Start Date: 2nd Qtr. FY 1989
Completion Date: 3rd Qtr. FY 1996

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1989	$ 6,000	$ 6,000	$ 5,633
1990	39,440	39,440	35,000
1991	75,000	75,000	48,000
1992	92,560	92,560	100,000
1993	105,000	105,000	110,000
1994	93,000	93,000	97,000
1995	45,000	45,000	49,000
1996	0	0	2,367

3. Narrative:

(a) Argonne National Laboratory has completed a conceptual design for, and plans to design, construct, and operate, a new-generation 6-7 GeV synchrotron radiation source. This facility is important for the Department's research program and will serve as a national resource for the conduct of research by industry, government, and university scientists. This facility will produce unprecedentedly brilliant x-ray beams to serve the research needs of virtually all scientific disciplines and many technological fields, e.g., physics, chemistry, materials and surface science, biology, and medicine. Users will include scientists, engineers, and graduate students from universities, industry, and research laboratories throughout the United States.

(b) The facility as currently envisaged would consist of a large storage ring containing as many as 35 insertion devices to give intense beams of hard x-rays. The injection and booster systems would be designed to inject positrons into the storage ring at the design energy of 6-7 GeV. Beam currents as high as 100 milliamperes and lifetimes of at least 10 hours are anticipated. Most

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importantly, the lowest possible beam emittance would be sought to give the highest brilliance x-ray source by a factor of 10,000 over any in existence. This facility would impact heavily on the fields of physics, materials, chemistry, biology and medicine, and many technologies. Determination of bulk and surface structure will be performed with greater resolution and accuracy. Microprobe characterization will allow impurity detection in the parts per billion range. The high brilliance will make possible inelastic x-ray scattering which is an essentially unexplored field. Investigating time-dependent phenomena in biological membranes and in photosynthetic processes will be possible, as will observing the motion of atoms in protein systems. Angiography and analysis of tumor diseases will be advanced through non-invasive and very fast x-ray diagnostics without, or with the minimal use of, dyes or drugs. Topography will be extended to time-resolved studies of plastic deformation and fracture. All of these investigations are made possible by the photon energy, time-structure, intensity, and unusual brilliance of the radiation source. Other experiments important to national security needs would also be undertaken.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 6,000	$30,440	$75,000	$335,560
Capital Equipment	2,300	500	1,000	1,000	4,000
Operating Expenses	15,000	5,822	10,500	15,500	125,300

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Basic Energy Sciences

IV. B. Plant Funded Construction Project

1. Project title and location: 87-R-406 1-2 GeV Synchrotron Radiation Source
Lawrence Berkeley Laboratory
Berkeley, California

Project TEC: $ 99,500
Start Date: 1st Qtr. FY 1987
Completion Date: 4th Qtr. FY 1992

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1987	$ 1,500	$ 1,500	$ 985
1988	18,000	18,000	10,317
1989	25,000	25,000	21,952
1990	25,636	25,636	30,050
1991	23,000	23,000	22,350
1992	6,364	6,364	13,846

3. Narrative:

(a) The 1-2 GeV Synchrotron will be built within the Lawrence Berkeley Laboratory, which is located on University of California property adjacent to the Berkeley campus. The project will include the construction of new facilities, and alterations and additions to existing plant and site facilities. The 1-2 GeV Synchrotron is a special facility comprised of an electron storage ring and injection system, insertion devices (undulators and wigglers) for generating synchrotron radiation and photon beamlines.

(b) The 1-2 GeV Synchrotron Facility will be a dedicated synchrotron radiation source that is optimized for generating vacuum ultraviolet (VUV) and soft x-ray (XUV) light from periodic magnetic devices. Investigators from industry, universities, and national laboratories will have access to unique capabilities--high spectral brilliance and very short pulse length (nominally tens of picoseconds). This brilliance makes possible new studies in both basic and applied science including: 1) materials and surface science; 2) atomic and molecular physics; 3) chemistry; 4) biology; 5) industrial utilization; and 6) areas of national security.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$19,500	$25,636	$25,636	$23,000	$ 6,364
Capital Equipment	1,000	1,000	1,500	1,000	1,000
Operating Expenses	3,500	1,873	6,000	11,000	18,600

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH

OVERVIEW

ENERGY RESEARCH ANALYSES

The Office of Program Analysis (OPA) manages the Energy Research Analyses Program to fulfill one of the major responsibilities of the Director of the Office of Energy Research. The Department of Energy Organization Act (Public Law 95-91) states "...It shall be the duty and responsibility of the Director [of the Office of Energy Research] (1) to advise the Secretary with respect to the physical research program...[and] (2) to monitor the Department's energy research and development programs in order to advise the Secretary with respect to any undesirable duplication or gaps in such programs...". Accordingly, the Office of Program Analysis arranges for and participates in the assessments of research projects and programs in order to judge the significance of these efforts and to identify undesirable duplications and gaps.

There are two types of independent technical assessments performed by OPA on research programs throughout the Department. First, OPA staff perform comprehensive project by project evaluations of major programs using outside experts from industry, academia and the National Laboratories. These peer reviews of ongoing projects provide the basis for judgments on the quality of the research and its impact. DOE Principal Officers responsible for energy R&D recognize that without these reviews less technically competitive projects might be continued.

Second, technical assessments provide independent views on the directions that future R&D in specific areas should take to be more productive and relevant to DOE missions. Research assessments are performed by contractors and OPA staff drawing on the world's leading experts in the specific fields being addressed. State-of-the-science reviews by the Foreign Applied Sciences Assessment Center (FASAC) and JASON's are also performed. In addition, the Energy Research Advisory Board (ERAB) funded by this office addresses questions posed directly by the Secretary or the Director, Office of Energy Research, and provides views based upon their expertise.

In addition, OPA has the responsibility within DOE for providing financial support for management of the National Acid Precipitation Assessment Program (NAPAP) created by the Acid Precipitation Act of 1980 (P.L. 96-294). OPA provides funds under NAPAP for summarizing and synthesizing the state of the science in acid rain research and producing assessment reports useful for policy makers. The final report is to be prepared in FY 1990, but FY 1991 will be used to aggregate responses to the final report and assess ongoing monitoring/research of key areas.

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ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

LEAD TABLE

Energy Research Analyses

Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Base	FY 1991 Request	Program Change Request vs Base	
					Dollar	Percent
Operating Expenses						
Energy Research Analyses (OE)	$3,760 a/	$3,800	$3,800	$3,683	- 117	- 3
Subtotal Operating Expenses...	$3,760	$3,800	$3,800	$3,683	- 117	- 3
Total.....	$3,760	$3,800 b/	$3,800	$3,683	- 117	- 3
Operating Expenses.....	($3,760)	($3,800)	($3,800)	($3,683)	- 117	- 3

Authorization: Section 209, P.L. 95-91.

a/ Total has been reduced by $40,000 which has been transferred to the SBIR program.
b/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
OFFICE OF ENERGY RESEARCH
(dollars in thousands)

SUMMARY OF CHANGES

Energy Research Analyses

FY 1990 Appropriation	$ 3,800
FY 1991 Base	3,800
- Represents a slight decrease in assessment support	- 117
FY 1991 Congressional Budget Request	$ 3,683

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

ENERGY RESEARCH ANALYSES

I. Preface: Energy Research Analyses

The Office of Program Analysis manages the Energy Research Analyses program to fulfill one of the responsibilities of the Director, Office of Energy Research. The Department of Energy's Organization Act (Public Law 95-91) states "It shall be the duty and responsibility of the Director (Office of Energy Research) (1) to advise the Secretary with respect to the physical research program...(and) (2) to monitor the Department's energy research and development programs in order to advise the Secretary with respect to any undesirable duplication or gaps in such programs...". Accordingly, the Office of Program Analysis assesses research projects and programs in order to judge the significance of these efforts and to identify undesirable duplications and gaps.

II. A. Summary Table: Energy Research Analyses

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Program Technology Assessment	$ 2,573	$ 2,800	$ 2,785	- 1
Environmental Issues Support	1,187	1,000	898	- 10
Total, Energy Research Analyses	$ 3,760	$ 3,800	$ 3,683	- 3

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory	$ 505	$ 200	$ 450	+125
Brookhaven National Laboratory	$ 283	$ 100	$ 100	0
Oak Ridge National Laboratory	$ 1,483	$ 300	$ 600	+100
Pacific Northwest Laboratory	$ 300	$ 500	$ 300	- 40

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Energy Research Analyses			
Program Technology Assessment	Performed technical assessments of membrane separations (ER, CE) and laser instrumentation (ER). Completed Basic Energy Sciences and High Energy Physics program accomplishments reports. Conducted peer reviews in Conservation & Solar Renewable programs. Supported ERAB, JASON, FASAC, Small Business Innovative Research (SBIR), and Energy Technology System Analysis program (ETSAP).	Perform technical assessment in Energy Research, Fossil Energy, and Conservation and Solar Renewable areas (e.g., catalysis, transportation, materials). Perform peer reviews for programs in Fossil Energy and Conservation and Solar Renewables. Support external R&D review through groups outside OPA; e.g., ERAB, JASON, FASAC, SBIR, and ETSAP.	Perform technical assessments in Fossil Energy (FE), Conservation & Solar Renewables (CE), and Energy Research areas (e.g., recyclable plastics, polymer composites). Perform peer reviews in FE and CE. Support external R&D review through groups outside OPA; e.g., ERAB, JASON, FASAC, SBIR, and ETSAP.
	$ 2,573	$ 2,800	$ 2,785
Environmental Issues Support	Provided DOE share of NAPAP management and technical staff under P.L. 98-294. Draft portions of final assessment for 1990 concluding the 10-year NAPAP program. Completed analysis of advance models of aquatic chemistry and regional ozone estimates and aerosal health effects. Started assessment of the results of the direct-delayed aquatic response program.	Provide DOE share of NAPAP management and technical staff under P.L. 98-294. Draft portions of final assessment for 1990 concluding the 10-year NAPAP program. Complete analysis of advance models of aquatic chemistry and regional ozone estimates and aerosal health effects. Start assessment of the results of the direct-delayed aquatic response program.	Provide DOE share of support for management and technical staff for acid precipitation assessments. Complete remainder of final assessment and review of ongoing research and monitoring of acid precipitation. Support response to critical reviews of NAPAP final assessment, as well as scientific analyses of other environmental issues.
	$ 1,187	$ 1,000	$ 898
Energy Research Analyses	$ 3,760	$ 3,800	$ 3,683

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH

OVERVIEW

UNIVERSITY RESEARCH INSTRUMENTATION

The objective of the University Research Instrumentation (URI) program is to strengthen the ability of universities to conduct long-range research related to the high priority energy technologies by assisting these institutions in acquiring the required state-of-the-art instrumentation. Another objective of the URI program is to provide graduate students with hands-on experience in the use of sophisticated research instrumentation.

The Department of Energy's URI program is an annual competitive program, which involves substantial cost-sharing from the institution. The URI awards are made to universities both on the merit and accomplishments of current DOE-supported research projects and the degree to which the new equipment will enable the scientists to substantially advance the understanding of energy-related phenomena. A total of 138 URI awards have been made in the past 6 years, ranging from $100,000 to $500,000 (the average award being $215,000). Total cost sharing provided by the universities has been $7,200,000.

The URI program is an integral part of the Department's long-range and applied research efforts. In general, the DOE technical program research grants/contracts to universities provide support for research operating costs (i.e., salaries, computer time, etc.). Funding for new instrumentation is generally limited to those smaller instruments costing on the average of $30,000 or less. The URI program assists the Department's energy research and technology programs by helping universities purchase instruments which cost in excess of $100,000, and which will be required by a number of faculty researchers. Because of their size and cost, if used by a single investigator these instruments could not be justified on an individual research award. Each year the Department's program managers help select the high priority energy topic areas which are emphasized in the URI program announcement. During the past few years, the URI program has given special attention to the need for advanced scientific equipment for research on metallurgy, ceramics, solid state materials, catalysis, fluid mechanics, nuclear physics, heat transfer, geophysics, nuclear medicine, fermentation, plant growth, atmospheric and marine pollutants, combustion and nuclear waste storage and environmental and health related research.

Since FY 1986 the URI program has encouraged the submission of proposals involving "innovative" instrumentation (equipment generally not available at U.S. universities). In FY 1991, special emphasis will continue to be placed on "innovative" instrumentation needs for advanced topics in energy research. This emphasis will enable the Department to encourage the nation's best scientists to undertake advanced energy research requiring state-of-the-art, often unique research instrumentation. A recent survey estimated that the overall short-term need for advanced scientific instrumentation for university energy research was approximately $150,000,000. Of this amount, about $15-20,000,000 was for "innovative" equipment.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

LEAD TABLE

University Research Instrumentation

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs Base	
					Dollar	Percent
University Research Instrumentation (OE).....	$4,938 a/	$4,930 b/	$4,930	$4,924	$ - 6	0

Authorization: Section 209, P.L. 95-91.

a/ Total has been reduced by $62,000 which has been transferred to SBIR.
b/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.

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DEPARTMENT OF ENERGY
FY 1990 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH
(dollars in thousands)

SUMMARY OF CHANGES

University Research Instrumentation

FY 1990 Appropriation	$ 4,930
Adjustments	0
FY 1991 Base	$ 4,930
Program increases and decreases:	
Instrumentation awards remain the same as FY 1990	- 6
FY 1991 Congressional Budget Request	$ 4,924

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

UNIVERSITY RESEARCH INSTRUMENTATION

I. Preface: University Research Instrumentation

Support is provided to universities for the purchase of state-of-the-art scientific research equipment costing over $100,000. The principal objective of the program is to strengthen the ability of university scientists to conduct long-range research related to the high priority DOE fundamental science and energy technology research. An ancillary objective of the URI program is to provide graduate students with hands-on experience in the use of sophisticated research instrumentation.

II. A. Summary Table: University Research Instrumentation

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
University Research Instrumentation	$ 4,938	$ 4,930	$ 4,924	0
Total, University Research Instrumentation	$ 4,938	$ 4,930	$ 4,924	0

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
University Research Instrumentation	Supported 20 instrumentation awards. ($4,938)	Will support 18-20 instrumentation awards. ($4,930)	Will support 18-20 instrumentation awards. ($4,924)
	$ 4,938	$ 4,930	$ 4,924
University Research Instrumentation	$ 4,938	$ 4,930	$ 4,924

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

OVERVIEW

UNIVERSITY AND SCIENCE EDUCATION

There is growing consensus that one of the most serious problems facing the nation over the next ten years is the declining number of young Americans, including women and minorities, interested in pursuing careers in science and engineering. This problem is further compounded by the often poor and inadequate preparation received by young students interested in such careers. The crisis in science education has serious implications for the nation's continued international economic and technological competitiveness. Future success in meeting the Department's science, energy and defense R&D missions is also heavily dependent on the quantity and quality of the Department's scientific and technical workforce. In order to carry out these missions, DOE is both a user and a patron of a large fraction of the nation's scientific and technical workforce. The Department and its predecessor agencies have historically supported programs designed to help replenish the nation's scientific manpower pool, while at the same time encouraging young students to pursue scientific and technical careers in fields of direct programmatic interest to the Department.

The University and Science Education Program (USE) and the related University Research Instrumentation Program (URI) have been the primary programmatic approaches used by DOE to strengthen the nation's science education and research infrastructure to ensure their effective contribution to the Department's long-range R&D missions. Much of this support involves the use of the unique facilities and resources at the Department's national laboratories and research facilities to assist in science education from the precollege through postdoctoral levels. The USE program also includes the Department's R&D Laboratory Technology Transfer Program which encourages the development of links between the Department's laboratories and private industry for the purpose of accelerating the transfer of Department-supported technology to the private sector. Specifically, the USE program consists of three major subprograms and a set of interrelated program activities focused on the following primary objectives:

1. Utilize the unique resources of the Department's laboratories (scientists, facilities and equipment) to assist in the national effort to strengthen the nation's economical, technological and educational competitiveness.

2. Strengthen university capability to perform long-range energy R&D;

3. Enhance the quality and increase the numbers of young people, including minorities and women, interested in pursuing energy-related scientific/technical careers;

4. Take full advantage of the unique resources and facilities at DOE laboratories to enhance both university faculty and student research, and precollege science education.

The first USE subprogram, the Laboratory Cooperative Science Centers program, includes support for 1) precollege student and teacher research and training; and for 2) undergraduate, graduate and faculty research appointments at DOE laboratories and DOE university consortia. The critical contributions of the Department's laboratories to science education involving "hands-on" research experiences for precollege and university-level participants have been strongly endorsed by the Energy Research Advisory Board (ERAB), the White House Science Council and the Congressional Office of Technology Assessment. Consistent with these analyses and the President's goal of improving our national science and technology research and education base, the DOE laboratories represent unique resources for the Department's participation in science education.

The FY 1991 request builds on this strong base of involvement of the DOE laboratories in science education at both the precollege and university level and implements the Administration's commitment to improve math and science literacy in the U.S. This commitment was the focus of a Math/Science Education Action Conference cohosted by the Secretary of Energy James D. Watkins and Nobel Laureate Glenn T. Seaborg in Berkeley, California, early in FY 1990. Support will be provided for comprehensive programs at the national, regional and local level conducted at several laboratories that have made an institutional commitment to support science education through the establishment of Science Centers. This includes 1) summer and semester-length research appointments for undergraduate science and engineering students; 2) summer and academic-year appointments for university faculty and graduate students and 3) support for precollege student and teacher research appointments including the prestigious DOE High School Science Students Honors Research Program. Two additional initiatives are proposed in FY 1991. The first initiative will provide support for precollege mathematics education activities undertaken by DOE laboratories in response to recommendations from the Conference Board on Mathematical Science of the National Academy of Sciences. The second initiative involves cost-shared support for the development of travelling museum exhibitions and classroom educational materials on DOE-related scientific and technical program activities.

The second USE subprogram, University Programs, includes support for university-based efforts directed at encouraging more young people, including minorities and women, to pursue energy-related scientific and technical careers. Support will be provided in FY 1991 for a major expansion of the Department's Prefreshman Engineering Program (PREP) to involve 3000 middle-school students in summer workshops on mathematics, science and engineering conducted by universities on their campuses.

The third USE subprogram, University Reactor Fuel Assistance, provides support for refueling and related activities for university nuclear research and training reactors.

The fourth USE subprogram, R&D Laboratory Technology Transfer, provides support to industry scientists and engineers to work on assignment at a DOE laboratory, with laboratory scientists, to transfer DOE-developed technology to the private sector for commercial application. These assignments are cost-shared with industry and involve both large and small companies. Support is also provided for pilot laboratory initiatives to improve the process for transferring Federally-funded R&D to U.S. industry and for improving and broadening communication to the private sector of the technology transfer opportunities available at the DOE laboratories. The R&D Technology Transfer Program supports DOE laboratory efforts to spin-off new technology to U.S. industry and university sectors consistent with P.L. 99-502 and E.O. 12591 to ensure benefits from commercialization of DOE-funded research.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

LEAD TABLE

University and Science Education Program

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs Base	
					Dollar	Percent
Laboratory Cooperative Science Centers.....	$11,162	$11,876	$11,876	$18,230	$+6,354	+ 54%
University Programs.....	6,857	6,761	6,761	1,900	-4,861	- 72%
University Reactor Fuel Assistance.....	2,040	4,059	4,059	7,230	+3,171	+ 78%
R&D Laboratory Technology Transfer.....	1,385	2,219	2,219	2,400	+ 181	+ 8%
Total Program (OE).....	$21,444 a/	$24,915 b/	$24,915	$29,760	$+4,845	+ 19%

Authorization: Section 209, P.L. 95-91.

a/ Total has been reduced by $269,000 which has been transferred to SBIR.
b/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

University and Science Education

FY 1990 Appropriation	$24,915
- Discontinue nuclear engineering research and education program	-5,857
- Support student and teacher/faculty research at additional DOE laboratories and laboratory/university partnerships to increase minority student access to energy-related research	+ 800
- Increase precollege science teacher research appointments and minority high school student appointments to encourage more students to stay in the math/science pipeline	+1,250
- Initiate inner city/rural partnerships designed to revitalize math/science in targeted school districts	+1,950
- Completion of university reactor upgrade and reactor housing at Arkansas Technical University	-1,826
- Decrease activities in base laboratory cooperative science centers program	- 646
- Maintain reactor fuel assistance and manpower development	+ 6

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- Initiate precollege mathematics science education program at DOE labs	+2,000
- Initiate museum-based science education program	+1,000
- Provide for program needs for uranium enrichment	+5,000
- Broaden focus of Pre-Freshman Engineering Program	+ 987
- Maintain support for laboratory technology transfer activities, including visiting industrial scientists appointments	+ 181
FY 1991 Congressional Budget Request	$29,760

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

UNIVERSITY AND SCIENCE EDUCATION

I. Preface: Laboratory Cooperative Science Centers

Support is provided for precollege science students and teachers and for university faculty, graduate, and undergraduate students to participate in summer and semester-length research and education activities at DOE laboratories. The objectives of this effort are to provide hands on research experience in cutting edge science thereby stimulating students to prepare for careers in science and technology fields and enhancing the knowledge and skills of their teachers and faculty. The principal approach of this program takes full advantage of the unique resources and facilities at the DOE laboratories for research and support of related education. Support is also provided for high school science student honors research, science teacher research appointments, undergraduate science semester program research, and precollege and university level faculty/student team research at DOE laboratories that have established comprehensive lab coop science education programs.

II. A. Summary Table: Laboratory Cooperative Science Centers

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Laboratory Cooperative Science Centers	$ 11,162	$ 11,876	$ 18,230	+ 54
Total, Laboratory Cooperative Science Centers	$ 11,162	$ 11,876	$ 18,230	+ 54

II. B. Major Laboratory and Facility Funding

Ames Laboratory	$ 95	$ 83	$ 99	+ 19
Argonne National Laboratory	$ 2,729	$ 2,489	$ 2,749	+ 10
Brookhaven National Laboratory	$ 920	$ 711	$ 994	+ 40
Fermi National Accelerator Laboratory	$ 360	$ 247	$ 106	- 57
Lawrence Berkeley National Laboratory	$ 720	$ 562	$ 851	+ 51
Lawrence Livermore National Laboratory	$ 148	$ 0	$ 140	>999
Los Alamos National Scientific Laboratory	$ 275	$ 246	$ 298	+ 21
Mound Facility	$ 75	$ 67	$ 99	+ 48
Oak Ridge Associated Universities	$ 1,748	$ 1,662	$ 1,334	- 20
Oak Ridge National Laboratory	$ 575	$ 398	$ 1,220	+207
Pacific Northwest Laboratory	$ 158	$ 198	$ 511	+158
Savannah River Ecology Laboratory	$ 100	$ 88	$ 99	+ 13
Savannah River Laboratory	$ 75	$ 67	$ 99	+ 48

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III. Activity Descriptions (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Laboratory Cooperative Science Centers			
Laboratory Cooperative Science Centers	Supports semester-length research appointments for 450 science/engineering undergraduate students at six laboratory science centers (ANL, BNL, LBL, ORNL, PNL and LANL) and 36 faculty/student research teams. Provides support for 2,000 summer faculty/student research appointments at 10 DOE laboratories. ($9,342)	Similar faculty/student participant levels as in FY 1989. ($10,058)	Slightly reduced levels as compared to FY 1990. ($9,370)
			Consistent with the Secretary's commitment to more fully utilize the Department's lab resources in improving science education, support a variety of student and teacher/faculty research activities at Fermilab and support laboratory-university partnerships to undertake initiatives to increase minority student access to energy-related research careers. ($800)
	Continues support for laboratory-based precollege science student and teacher programs including seven DOE high school science student honors research programs involving 364 nationally-selected students. Also provides support for 150 high school science teacher research appointments at ten DOE laboratories. ($1,820)	Similar levels as in FY 1989. ($1,818)	Similar levels as in FY 1990. ($1,860)

III. Laboratory Cooperative Science Centers (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Laboratory Cooperative Science Centers (Cont'd)			Support an increase in highest priority programs involving precollege science teacher research associate appointments and additional minority high school research apprenticeship appointments to encourage more students to stay in the math/science pipeline. Also support initiation of a cost-shared program to encourage more science/engineering students to pursue careers in precollege science/math teaching and provide support for related collaborative projects with other Federal agencies. These efforts are in keeping with the priorities established during the Secretary's Math/Science Education Action Conference. ($1,250)
	No activity. ($0)	No activity. ($0)	Initiate inner city/rural partnerships designed to revitalize math/science in targeted school districts as called for at the Secretary's Math/Science Education Action Conference and in the recent Task Force report on Women, Minorities and the Handicapped. Implement Secretary's commitment to near-term actions in support of improved science education for minorities and other disadvantaged groups. Provide support for collaborative projects, among DOE laboratories, other Federal agencies, and the public and private sectors. ($1,950)

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III. Laboratory Cooperative Science Centers (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Laboratory Cooperative Science Centers (Cont'd)	No activity. ($0)	No activity. ($0)	Initiate precollege mathematics science education program conducted at DOE labs. Provides support for summer research appointments for high school math teachers and summer institutes for middle school teachers on new concepts and techniques in math instruction. Also utilizes DOE laboratories as sites to introduce school district math coordinators to science/math in context of mission-oriented research. Provides support for cost-shared projects with NASA, and NSF in development of new advanced computer graphics for use in middle-school science and math classes. Initiative includes major emphasis on participation of inner-city math teachers. ($2,000)
	No activity.	No activity.	Initiate museum-based science education program. Provides support for development of cost-shared museum science education exhibitions on major energy-related scientific programs. Exhibitions (including special precollege student/teacher materials) would travel to ten urban science museums over two year period reaching over one million adults, teachers and students. ($1,000)
	$ 11,162	$ 11,876	$ 18,230
Laboratory Cooperative Science Centers	$ 11,162	$ 11,876	$ 18,230

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

UNIVERSITY AND SCIENCE EDUCATION

I. Preface: University Programs

Support is provided for science education and research-related efforts in areas of direct relevance to DOE where universities and colleges are the principal performers. Support is included for scientific and technical manpower development efforts, the collection and analysis of data on the supply and demand of scientists and engineers for current and future energy R&D programs, and the maintenance of a strong university research and manpower development base in nuclear science and engineering. Includes support for fabrication and shipping of fuel for university nuclear research reactors and continued support for the NRC-mandated conversion of selected university reactors to Low Enriched Uranium (LEU).

II. A. Summary Table: University Programs

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
University Programs	$ 6,857	$ 6,761	$ 1,900	- 72
Total, University Programs	$ 6,857	$ 6,761	$ 1,900	- 72

II. B. Major Laboratory and Facility Funding

Oak Ridge Associated Universities	$ 392	$ 388	$ 390	+ 1

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
University Programs			
University Programs (Cont'd)	Provides support for university nuclear engineering research projects and for joint laboratory-university nuclear engineering education efforts. ($5,929)	Continue nuclear engineering research program. ($5,857)	No activity. ($0)
	Continues analyses of manpower energy-related fields including assessment of needs for advanced degree professionals. ($519)	Similar to FY 1989. ($541)	Similar to FY 1990. ($550)
	Supports 20 Prefreshman Engineering Projects reaching 2000 junior high school women and minority students. ($409)	Similar ongoing activities as in FY 1989. ($363)	Broadens focus of PREP to include all fields of science/math. Expands eligibility to include 6th grade students with repeat participation encouraged. Broadens focus of support provided for 33 awards, fully funded for two years at approximately $20K per year. Enhanced program will reach 3000 women/minority students in FY 1991 and 6000 students in succeeding years. ($1,350)
	$ 6,857	$ 6,761	$ 1,900
University Programs	$ 6,857	$ 6,761	$ 1,900

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

UNIVERSITY AND SCIENCE EDUCATION

I. Preface: University Reactor Fuel Assistance

Provides support associated with the fabrication and shipping of nuclear fuel for university-based research/training reactors. The university-based nuclear research and manpower development effort is highly dependent on these specialized facilities, not only for nuclear related training, but also for research in the basic sciences. Support is provided through this program for the NRC-mandated conversion of university reactors to low enriched uranium fuel. This subprogram also includes support on a competitive basis for university reactor sharing grants which provide research and training opportunities for faculty/students from nearby universities and colleges without direct access to research reactors.

II. A. Summary Table: University Reactor Fuel Assistance

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
University Reactor Fuel Assistance.....	$ 2,040	$ 4,059	$ 7,230	+ 78
Total, University Reactor Fuel Assistance	$ 2,040	$ 4,059	$ 7,230	+ 78

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory	$ 200	$ 196	$ 50	- 74
Brookhaven National Laboratory	$ 0	$ 0	$ 15	>999
Idaho National Engineering Laboratory - EG&G	$ 1,618	$ 1,604	$ 1,599	0
Savannah River Laboratory	$ 85	$ 0	$ 25	>999

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
University Reactor Fuel Assistance			
University Reactor Fuel Assistance	Provides refueling for 4 reactors (2 with LEU fuel) and funds 20 reactor sharing grants. Continues support for LEU conversion. ($2,040)	Provides refueling for two reactors requiring HEU fuel (MIT and Missouri) and continues LEU conversion activities at four reactors (Virginia, Missouri-Rolla, Iowa State and Georgia Tech). Supports 20 reactor sharing grants. ($2,233)	Provides continuing fuel support for University of Missouri and MIT and supports 20 reactor sharing grants. Supports LEU fuel fabrication for University of Michigan and Rhode Island reactors. ($2,230)
	No activity. ($0)	Support for upgrade university reactors and provide reactor facility at Arkansas Technical University as mandated by Congress. ($1,826)	No activity. ($0)
	No activity. ($0)	No activity. ($0)	Provide for program needs for uranium enrichment and fuel conversion costs. ($5,000).
	$ 2,040	$ 4,059	$ 7,230
University Reactor Fuel Assistance	$ 2,040	$ 4,059	$ 7,230

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

UNIVERSITY AND SCIENCE EDUCATION

I. Preface: R&D Laboratory Technology Transfer

This Department-wide program aims at facilitating the effective spin-off of Federally supported technology from the laboratories, making the results of research and development available to the private sector for applications in the marketplace. Assignment of industry scientists at multiprogram and major single program laboratories and support of pilot technology transfer initiatives are integral components of this program. Consistent with the President's Executive Order on Facilitating Access to Science and Technology, the U.S., private and public sectors can broaden their technology base with new knowledge and opportunities from Federal laboratories.

II. A. Summary Table: R&D Laboratory Technology Transfer

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
R&D Laboratory Technology Transfer	$ 1,385	$ 2,219	$ 2,400	+ 8
Total, R&D Laboratory Technology Transfer	$ 1,385	$ 2,219	$ 2,400	+ 8

II. B. Major Laboratory and Facility Funding

Ames Laboratory	$ 0	$ 0	$ 75	>999
Argonne National Laboratory	$ 50	$ 132	$ 125	- 5
Brookhaven National Laboratory	$ 0	$ 29	$ 125	+331
Fermi National Accelerator Laboratory	$ 0	$ 0	$ 75	>999
Idaho National Engineering Laboratory - EG&G	$ 0	$ 0	$ 125	>999
Lawrence Berkeley National Laboratory	$ 0	$ 155	$ 125	- 19
Lawrence Livermore National Laboratory	$ 0	$ 29	$ 125	+331
Los Alamos National Scientific Laboratory	$ 0	$ 0	$ 125	>999
Oak Ridge National Laboratory	$ 0	$ 123	$ 125	+ 2
Pacific Northwest Laboratory	$ 137	$ 82	$ 125	+ 52
Sandia National Laboratories	$ 0	$ 0	$ 125	>999
Solar Energy Research Institute	$ 0	$ 29	$ 75	+159

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
R&D Laboratory Technology Transfer			
R&D Laboratory Technology Transfer	Increase number of industry-laboratory technology exchange assignments to 30, adding some targeted assignments in high temperature superconductivity pilot centers.	Fund 30 industry-laboratory technology exchange assignments at multiprogram and major single program laboratories.	Continue funding 30 industry-laboratory exchange assignments and emphasize 2-way exchanges. Initiate university-laboratory exchange assignments for technology transfer purposes.
	Pursue highly leveraged laboratory technology transfer initiatives including some in support of the high temperature superconductivity pilot centers with strong cost-sharing component. ($1,385).	Fund additional highly leveraged laboratory technology transfer initiatives that have the prospect of broad applications in response to increased opportunities as laboratory technology transfer programs expand.	Continue centralized communication of laboratory opportunities and accomplishments, as mandated by P.L. 99-502 and perform planning for a data base of research in progress and laboratory capabilities.
		Provided support for program activities, including communication of DOE laboratory technology transfer accomplishments, as mandated by P.L. 99-502 ($2,219).	Continue funding cost-shared laboratory technology transfer initiatives including the partnership concept with State economic development activities and jointly funded projects to bridge the gap between laboratory technology development and industry product enhancement needs. ($2,400)
	$ 1,385	$ 2,219	$ 2,400
R&D Laboratory Technology Transfer	$ 1,385	$ 2,219	$ 2,400

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT

OVERVIEW

ADVISORY AND OVERSIGHT PROGRAM DIRECTION

This program provides the staffing resources and associated funding required by the Director of Energy Research to carry out his responsibilities under the Department of Energy Organization Act (P.L. 95-91) and as mandated by the Secretary in areas beyond the scope of the other assigned Energy Research programs. It supports the staff in the Office of Field Operations Management, Office of Program Analysis, Science and Technology Affairs Staff, and related program and management support staff.

The staff budgeted in this program supports the Director of Energy Research by providing technical assessments, independent peer reviews and program evaluations, and interagency coordination of research assessments. It oversees DOE's multiprogram nonweapons laboratories and develops and implements university research science education and manpower development and facilities management programs in support of DOE goals and missions to promote health and safety and a clean environment, to enhance scientific competitiveness, and to contribute to the Nation's energy security. This staff also supports the Director of Energy Research in his role as science advisor to the Secretary of Energy and supports the Lawrence and Fermi Awards process.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

LEAD TABLE

Advisory and Oversight Program Direction

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs Base	
					Dollar	Percent
Energy Oversight, Research Analysis and University Support						
Advisory and Oversight Program Direction						
Operating Expenses.....	$3,339	$3,326 a/	$4,250	$4,250	--	--
Staffing (FTE's).....	45	50 b/	50	50		

Authorization: Section 209, P.L. 95-91.

a/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.
b/ Revised request.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Advisory and Oversight Program Direction

FY 1990 Appropriation	$ 3,326
Adjustments - Increased personnel costs	+ 924
FY 1991 Base and Congressional Budget Request	4,250

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

ADVISORY AND OVERSIGHT PROGRAM DIRECTION

I. Preface: Advisory and Oversight Program Direction

This program provides the Federal staffing and associated funding resources required by the Director of Energy Research to carry out his responsibilities under the Department of Energy Organization Act (P.L. 95-91) and as mandated by the Secretary in areas beyond the scope of the other assigned Energy Research programs.

II. A. Summary Table: Advisory and Oversight Program Direction

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Advisory and Oversight Program Direction.....	$ 3,339	$ 3,326	$ 4,250	+ 28
Total, Advisory and Oversight Program Direction	$ 3,339	$ 3,326	$ 4,250	+ 28

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Advisory and Oversight Program Direction			
Advisory and Oversight Program Direction	Provided funds for salaries, benefits, and travel for 45 full-time equivalents (FTE's) in the Office of Field Operations Management, Office of Program Analysis, Science and Technology Affairs Staff, and related program and management support staff. ($3,111)	Provide funds for salaries, benefits, and travel to support 44 FTE's included in the FY 1990 budget including normal increased personnel costs. A revised request for six additional FTE's is discussed below. ($3,276)	Provide funds for salaries, benefits, and travel related to 50 FTE's. Provide for six additional FTE's over the FY 1990 budget as discussed in FY 1990. Also provide for normal increased personnel costs resulting, for example, from within-grade and merit increases and the impact of the FY 1990 general and executive pay raises. ($4,070)
	The Office of Program Analysis (OPA) provided technical assessments, independent peer reviews and program evaluations, and interagency coordination of research assessments. Represented DOE on the National Acid Precipitation Assessment Program (NAPAP). Prepared portions of the final NAPAP assessment and reviewed the entire assessment for accuracy, completeness, and objectivity.	Continue to perform technical assessments, independent peer reviews and program evaluations in support of DOE's basic research goals and support increased workload on environmental issues at the FY 1989 level of effort.	Provide technical assessments, independent peer reviews and program evaluations and support environmental issues at the level of effort included in the FY 1990 budget.
	The Office of Field Operations Management continued to develop and implement laboratory management and university research science education and manpower development programs in support of DOE goals and missions. Managed the University Reactor Fuel Assistance program including conversion of nuclear reactors to LEU fuel, the Laboratory Cooperative summer program, the Science Centers Research Semester Program, the University Research Instrumentation program and the Used Equipment program. Supported the Manpower Assessment program including	Provide three additional FTE's above the FY 1990 budget, related to improving facilities management Department-wide, including increasing ES&H-related workload and the Secretary's 10-point initiative to strengthen environmental protection activities; to support increased activities related to science education including increased interactions with DOE's adopted school, Woodrow Wilson High School, and increased effort to implement recommendations from the Secretary's Berkeley Math/Science Education Conference; and for increased	Provide three additional FTE's as discussed in FY 1990, to support increased workload related to improving facilities management Department-wide including ES&H-related activities; and to support new science education initiatives involving mathematics enrichment, museum-based science education, and graduate support in selected energy-related fields including nuclear engineering. Continue program management in support of the National goal to maintain U.S. competitiveness through education and development of human resources.

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III. Advisory and Oversight Program Direction (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Advisory and Oversight Program Direction (Cont'd)	support to the Task Force on Women, Minorities, and Handicapped. Supported the Director in oversight of DOE's multiprogram nonweapons laboratories, including management of the General Purpose Facilities construction program and the ORNL environmental compliance and cleanup program. -Managed the R&D laboratory technology transfer program and provided ER support to the DOE-wide Task Force on High Temperature Superconductivity Pilot Centers and the Standing Working Group on Technology Transfer. Managed the institutional planning process which includes the five major ER single program laboratories. Continued to oversee the laboratory appraisal process and the strengthened work for others policy. Supported the R&D Council established by the Under Secretary.	laboratory oversight. Continue support for Laboratory Cooperative Science Centers Program and student/faculty appointments, and support for precollege teacher/student research programs. Provide increased support for solving science education problems. Continue to oversee multiprogram nonweapons laboratories, manage the institutional planning process, and manage the MEL-FS program including improved facilities management and expanded oversight of escalating ES&H issues related to facility rehabilitation projects and to ensure compliance with numerous ES&H directives and regulations. Support the expanded activities related to quarterly meetings with directors of major DOE laboratories, the National Research Council (NRC) committee assessment study of the status of U.S. nuclear energy education, including increased laboratory oversight responsibilities. Support increased technology transfer responsibilities, including development of a baseline review of Departmental activities and input for the National Energy Strategy.	continue to support Laboratory Cooperative Science Centers Program, and precollege teacher/student research appointments and new initiatives at DOE laboratories targeted at minorities and women. Overview programs to increase precollege and college educational opportunities, including women and minorities. Manage University Research Instrumentation. Continue to oversee multiprogram nonweapons laboratories in support of energy R&D goals, and manage the institutional planning process and the MEL-FS program. Continue to oversee multiprogram facilities support through major rehabilitation projects and ES&H-related activities. Continue to support technology transfer from DOE laboratories as part of the National economic competitiveness initiative. Continue support to the quarterly laboratory directors meetings, nuclear energy education efforts and interagency meetings involving NSF, Department of Education and all major mission agencies
	The Science and Technology Affairs Staff provided ongoing support to the Energy Research Advisory Board (ERAB), which advises on DOE's R&D goals and strategies. Supported the Lawrence and Fermi Awards process, and supported the Director of ER in his role as science advisor to the Secretary of Energy.	Continue to support the ERAB and the Director of ER at the FY 1989 level of effort.	Continue to support the Director of ER at the FY 1990 level of effort.

III. Advisory and Oversight Program Direction (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Advisory and Oversight Program Direction (Cont'd)	Provided program and management support in the areas of budget and finance, personnel administration, acquisition and assistance, policy and coordination, and construction, environment and safety.	Provide three additional FTE's above the FY 1990 budget level for enhanced ES&H oversight capability and support to line management related to nuclear safety, health physics, occupational safety and industrial hygiene, environmental protection, hazardous waste management, safeguards and security, emergency preparedness, and quality assurance. Perform safety appraisals and environmental compliance audits.	Continue staff support activities at the revised FY 1990 level of effort with three additional FTE's for increased ES&H responsibilities.
	Provided program support such as printing, small purchases of supplies and materials, timesharing on various information systems and communications networks and contractual support. Also provided reimbursement of the Office of Scientific and Technical Information for services provided. ($228)	Continue the variety of program support required in FY 1989. ($50)	Continue the variety of program support required in FY 1989 and FY 1990. Also provide for support costs of Automated Office Support Systems workstations including hotline support, hardware modifications, upgrades, moves, and telecommunications/network support. ($180)
	$ 3,339	$ 3,326	$ 4,250
Advisory and Oversight Program Direction	$ 3,339	$ 3,326	$ 4,250

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

OVERVIEW

MULTIPROGRAM ENERGY LABORATORIES-FACILITIES SUPPORT

Attaining the energy R&D goals articulated in the National Energy Policy Plan (NEPP) involves significant use of the five DOE national laboratories supported by Energy Research. These are: Argonne National Laboratory (ANL), Brookhaven National Laboratory (BNL), Lawrence Berkeley Laboratory (LBL), Oak Ridge National Laboratory (ORNL), and Pacific Northwest Laboratory (PNL). DOE has a statutory responsibility to maintain the well-being of the national resource which these five laboratories represent. The replacement value of the facilities at these laboratories is $2.8 billion and they perform over $1 billion per year of mission R&D for the Department.

The MEL-FS program objective is to adequately maintain the capabilities of these laboratories to carry out their respective missions in accordance with relevant regulations and DOE orders. This is accomplished by supporting activities and projects which counter the problems of (1) aging and obsolescence of facilities, and (2) safety and health inadequacies. The program is fully integrated with the Department's planning process such as the institutional planning processes which overviews the overall management and utilization of the multiprogram laboratories.

The strategy of the program is to select and support activities and projects necessary to: (1) maintain operations of the laboratories in a safe, cost effective, and productive manner; and (2) reduce the backlog of facility deficiencies. Budgetary constraints, being experienced throughout the entire Federal government, have necessitated the selection and support of activities/projects critical to safe operation and necessary to ensure continued laboratory viability.

The benefits to be gained by supporting the levels in this budget request are: uninterrupted operation of the laboratories; decreased operating costs; improved safety, security, and environmental compliance levels; reduced health risks; and, improved productivity.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

LEAD TABLE

Multiprogram Energy Laboratories - Facilities Support

Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Base	FY 1991 Request	Program Change Request vs Base	
					Dollar	Percent
General Purpose Facilities Construction	$24,387	$22,123	$22,123	$23,743	$ + 1,616	+ 7%
Total	$24,387 a/	$22,123 a/b/	$22,123 a/	$23,743	$ + 1,616	+ 7%
Operating	$0	$0	$0	$0	$0	$0
Capital Equipment	$0	$0	$0	$0	$0	$0
Construction	(24,387)	(22,125)	(22,123)	(23,743)	+ 1,616	+ 7%

Authorization: Section 647, P.L. 95-91.

a/ Reflects comparability adjustment for Environmental Restoration as follows; FY 1989-$31,343,000; FY 1990-$29,632,000; FY 1991-$32,117,000.
b/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Multiprogram Energy Laboratories - Facilities Support

FY 1990 Appropriation	$ 22,123
- Maintain general purpose facilities projects on planned schedule	+ 1,616
FY 1991 Congressional Budget Request	$ 23,743

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

MULTIPROGRAM ENERGY LABORATORIES - FACILITIES SUPPORT

I. Preface: General Purpose Facilities

This subprogram originated in FY 1981 as a broad program for rehabilitation, upgrade or replacement of deficient buildings, utilities, roads, railroads and other facilities and addressing ES&H deficiencies at the laboratories. The backlog of deficiences is currently estimated at $700 million at the five multiprogram energy laboratories. These Government-owned sites are complete research reservations with advanced major scientific instrumentation and exceptional, often unique, research facilities with all necessary support facilities. These laboratories have performed national research programs for the Department and its predecessor agencies for nearly 40 years. They received over $1,000,000,000 in FY 1986 to perform national research and development programs. Over 17,000 scientists, engineers and other support staff are engaged in these activities. The productivity of the work force is greatly affected by the adequacy of the laboratories facilities.

The replacement costs of the existing government owned support facilities at five multiprogram energy laboratories exceed $2,800,000,000. Through continuous use and aging, as well as changing technology, these facilities deteriorate (both physically and in performance) to a point where they are no longer appropriate for their intended functions, economically justifiable to maintain, or adequate to meet security, safety, and health requirements. This subprogram addresses these requirements, as well as the large backlog of facility needs in a prioritized and systematic manner. Highest priority is assigned to those projects that address urgent safety, health and security deficiencies and those that can hamper or interrupt operations. The latter is primarily concerned with utilities - electrical, heating and cooling, water supply, waste disposal, etc. Next highest priority are those projects that concern efficiency and productivity of operations, such as providing adequate laboratory space, warehouse and shop facilities. Facility upgrade plans and all proposed projects and subprojects are consistent with the Institutional Plans and Site Development Plans for these laboratories.

As a result of DOE policy on management of environmental cleanup, all environmental projects that would have normally been funded by the General Purpose Facilities subprogram are now reassigned to one of the subprograms discussed subsequently in the Multiprogram Energy Laboratories - Facilities Support budget.

This program will help ensure the continued effective accomplishment of the Department's R&D missions today and in the future. The Multiprogram Energy Laboratories-Facilities Support program is an appropriate Federal role reflecting the responsible management of the Government's real property.

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II. A. Summary Table

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
General Purpose Facilities...	$ 24,387	$ 22,123	$ 23,743	+ 7%

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory....	$ 7,985	$ 6,736	$ 4,460	- 34%
Brookhaven National Laboratory.	4,247	5,841	4,566	- 22%
Hanford Engineering Development Laboratory*.....	375	0	0	--
Idaho National Engineering Lab*.	488	393	0	- 100%
Lawrence Berkeley Laboratory....	4,381	5,247	8,212	+ 56%
Lawrence Livermore Nat. Lab*....	312	0	0	--
Oak Ridge National Laboratory..	4,539	3,906	6,505	+ 67%
Pacific Northwest Laboratory...	2,060	0	0	--
Total.....	$ 24,387	$ 22,123	$ 23,743	+ 7%

* This program is no longer responsible for these laboratories, but is committed to completing any projects it started at these laboratories under its previous responsibility. These labs are now the responsibility of DOE Defense Programs and Nuclear Energy.

III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
Construction	Will provide for continuation of 6 ongoing projects ($21,117) consistent with planned schedules and initiation of 3 new projects: 1 road safety	Will provide for continuation of 9 ongoing projects ($15,344) consistent with planned schedules and initiation of 11 projects some of	Will provide for completion and continuation of all ongoing projects consistent with planned schedule. ($23,743)

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III. General Purpose Facilities (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Construction (Cont'd)	project, 1 fire protection project, and 1 utility project. ($3,270)	which had been postponed from FY 1989. ($6,779)	
Total General Purpose Facilities	$24,387	$22,123	$23,743

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Multiprogram Energy Laboratories - Facilities Support

IV. A. Construction Project Summary

Project No.	Project Title	Total Prior Year Obligations	FY 1990 Approp.	FY 1991 Request	Unappropriated Balance	TEC
Multiprogram Energy Laboratories - General Purpose Facilities						
90-R-121	Rehabilitation of Domestic and Firewater, Pumping and Storage Systems (ANL)	0	148	1,000	527	1,675
90-R-118	Fire Protection Upgrade (ORNL)	0	1,321	1,960	19	3,300
90-R-117	Slope/Seismic Stabilization (LBL)	0	493	2,200	1,007	3,700
90-R-113	Electrical Systems Upgrade (ORNL)	0	843	1,445	12	2,300
90-R-112	Measurements and Controls Support Facility (ORNL)	0	884	3,100	446	4,430
90-R-111	Original Labsite Substation (LBL)	0	247	2,400	303	2,950
90-R-110	Instrumentation Support Laboratory Rehabilitation (LBL)	0	197	1,800	3	2,000
90-R-109	Building Addition (BNL)	0	1,676	0	24	1,700
90-R-108	Central Shops Alteration and Addition (BNL)	0	306	1,370	4	1,680
90-R-107	Boiler Replacement (BNL)	0	319	3,196	5	3,520

Project No.	Project Title	Total Prior Year Obligations	FY 1990 Approp.	FY 1991 Request	Unappropriated Balance	TEC
90-R-100	Transportation Facility Replacement (ANL)	0	345	1,400	2,355	4,100
89-R-112	PCB Transformers (ANL)	975	478	0	7	1,460
89-R-108	Roads and Parking Safety Improvements (ORNL)	1,650	858	0	12	2,520
89-R-102	Fire Protection Improvements Phase II (BNL)	645	2,322	0	33	3,000
88-R-807	Electrical System Rehabilitation Phase I (ANL)	1,500	2,662	860	38	5,060
88-R-806	Environmental Health and Safety Project (LBL)	3,366	4,310	1,512	62	9,250
88-R-805	Environmental Improvements (BNL)	2,258	1,217	0	18	3,494
87-R-756	Water Line Replacement (ANL)	4,663	529	0	8	5,200
87-R-753	Rehabilitate Laboratory Space (ANL)	7,924	2,574	1,500	37	12,035
84-ER-103	Road Repairs (INEL, LBL, RL, ANL)	17,352	383	0	6	17,751
	Subtotal, General Purpose Facilities	40,333	22,123	23,743	4,926	XXXX
	Total Multiprogram Energy Laboratories - Facilities Support	40,333	22,123	23,743	4,926	XXXX

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Multiprogram Energy Laboratories - Facilities Support
General Purpose Facilities

IV. B. Plant Funded Construction Project

1. Project title and location: 90-B-121 Rehabilitation of domestic and firewater, pumping and storage system, Argonne National Laboratory (ANL) Argonne, Illinois

Project TEC: $ 1,675
Start Date: FY 1990
Completion Date: FY 1992

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1990	$148	$148	$140
1991	$1,000	$1,000	$500
1992	$527	$527	$525
1993	$ 0	$ 0	$510

3. Narrative:

(a) This project provides for the rehabilitation of eleven surface and elevated water storage tanks and eight pressure filter tanks located throughout the ANL site. This project also provides for rehabilitation of three well water pumps through overhaul of the motors, pump assemblies and line shafts and well castings.

(b) Present conditions are causing increased maintenance costs and system downtime and having a potential of impairing the laboratory's ability to respond properly to a fire emergency during these downtimes. The well water pumps have operated for 20-35 years. Two of these pumps provide over 50% of the water supply for the laboratory's drinking, fire protection, heating and research process operations. The fire water pump has operated for more than 30 years. Most of the parts are worn out and the housing indicated heavy corrosion.

(c) $1,000,000 is requested for FY 1991 funding. Construction will be underway.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 148	$ 1,000	$ 527
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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DEPARTMENT OF ENERGY
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ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Multiprogram Energy Laboratories - Facilities Support
General Purpose Facilities

IV. B. Plant Funded Construction Project

1. Project title and location: 90-R-118 Fire protection upgrade
Oak Ridge National Laboratory
Oak Ridge, Tennessee

Project TEC: $ 3,300
Start Date: FY 1990
Completion Date: FY 1993

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1990	$1,321	$1,321	$ 500
1991	1,960	1,960	1,100
1992	19	19	1,500
1993	0	0	200

3. Narrative:

(a) This project upgrades fire protection and life safety installations in key facilities at the Oak Ridge National Laboratory.

(b) The lack of automatic fire suppression sprinkler systems in occupied office areas and service areas in the main building wings of the ORNL Central Research and Administration Building presents a serious risk of a multi-million dollar fire loss and major interruption of program activities.

(c) $1,960,000 is requested in FY 1991. Construction will be initiated.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction.....	$ 0	$ 0	$ 1,321	$ 1,960	$ 19
Capital Equipment.....	0	0	0	0	0
Operating Expenses.....	0	0	0	0	0

DEPARTMENT OF ENERGY
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OFFICE OF ENERGY RESEARCH
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Multiprogram Energy Laboratories - Facilities Support
General Purpose Facilities

IV. B. Plant Funded Construction Project

1. Project title and location: 90-R-117 Slope and Seismic Stabilization Above the Bevatron, Building 51, and Mechanical Shops, Building 77
Lawrence Berkeley National Laboratory
Berkeley, California

Project TEC: $ 3,700
Start Date: FY 1990
Completion Date: FY 1993

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1990	$ 493	$ 493	$ 220
1991	2,200	2,200	1,510
1992	1,007	1,007	1,600
1993	0	0	370

3. Narrative:

(a) This project consists of planning, design and construction of two lateral support systems to stabilize two known landslide areas.

(b) This project will complete a long-term program at LBL which has succeeded in stabilizing other known landslide areas that could cause significant property damage in the event of a strong earthquake or static movement due to excessive soil moisture.

(c) $2,200,000 is requested in FY 1991. Construction will be initiated.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction.....	$ 0	$ 0	$ 493	$ 2,200	$ 1,007
Capital Equipment.....	0	0	0	0	0
Operating Expenses.....	0	0	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Multiprogram Energy Laboratories - Facilities Support
General Purpose Facilities

IV. B. Plant Funded Construction Project

1. Project title and location: 90-R-113 Electrical systems upgrade, Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee

Project TEC: $ 2,300
Start Date: FY 1990
Completion Date: FY 1991

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1990	$ 843	$ 843	$ 200
1991	$1,445	$1,445	$1,100
1992	$ 12	$ 12	$1,000

3. Narrative:

(a) This project will replace aged, obsolete, and unreliable equipment and hardware in the ORNL electrical system.

(b) The purpose of this project is the restoration of deteriorated distribution lines and the replacement of old and obsolete equipment needed to ensure a reliable source of electrical power as well as to meet the demands of the continuing research programs at ORNL.

(c) $1,445,000 is requested for FY 1991 funding. Construction will be underway.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction.....	$ 0	$ 0	$ 843	$ 1,445	$ 12
Capital Equipment.....	0	0	0	0	0
Operating Expenses.....	0	0	0	0	0

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DEPARTMENT OF ENERGY
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ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Multiprogram Energy Laboratories - Facilities Support
General Purpose Facilities

IV. B. Plant Funded Construction Project

1. Project title and location: 90-R-112 Measurements and controls support facility, Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee

Project TEC: $4,430
Start Date: FY 1990
Completion Date: FY 1992

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1990	$ 884	$ 884	$ 800
1991	$3,100	$3,100	$1,630
1992	$ 446	$ 446	$2,000

3. Narrative:

(a) This project will construct a two-story building providing approximately 20,000 sq. ft. in the Instruments and Controls complex.

(b) The purpose of this project is to provide adequate space and facilities for essential support personnel and functions presently located in a deteriorated wooden building and in converted laboratories and storage rooms in the ORNL complex.

(c) $3,100,000 is requested for FY 1991 funding. Construction will be underway.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction.....	$ 0	$ 0	$ 884	$ 3,100	$ 446
Capital Equipment.....	0	0	0	0	0
Operating Expenses.....	0	0	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
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ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Multiprogram Energy Laboratories - Facilities Support
General Purpose Facilities

IV. B. Plant Funded Construction Project

1. Project title and location: 90-R-111 Original labsite substation, Lawrence Berkeley Laboratory (LBL), Berkeley, California

Project TEC: $ 2,950
Start Date: FY 1990
Completion Date: FY 1992

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1990	$ 247	$ 247	$ 150
1991	$2,400	$2,400	$ 930
1992	$ 303	$ 303	$1,870

3. Narrative:

(a) This project is the second of several elements to improve the reliability of the electrical distribution system of the entire laboratory. It will install a new substation and provide for new distribution circuits to laboratory facilities.

(b) Current and future programmatic activities require reliable and economic power. The existing electrical distribution system is 40 years old. Deterioration of distribution cables and switching equipment has resulted in power outages and interruption of programmatic activities.

(c) $2,700,000 is requested for FY 1991 funding. Construction will be underway in FY 1991.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 247	$ 2,400	$ 303
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
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ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Multiprogram Energy Laboratories - Facilities Support
General Purpose Facilities

IV. B. Plant Funded Construction Project

1. Project title and location: 90-R-110 Instrumentation support laboratory rehabilitation, Lawrence Berkeley Laboratory (LBL), Berkeley, California

Project TEC: $ 2,000
Start Date: FY 1990
Completion Date: FY 1992

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1990	$197	$197	$110
1991	$1,800	$1,800	$990
1992	$3	$3	$900

3. Narrative:

(a) This project will rehabilitate 4,700 sq. ft. of office and laboratory space on the third floor of Building 70A, a multiprogram laboratory, to provide improved and upgraded cleanroom facilities.

(b) This project will rehabilitate the essential core facilities that provide instrumentation support to all R&D programs at LBL. The obsolescence of existing instrumentation support facilities severely limits adequate and timely support to R&D activities.

(c) $1,800,000 is requested for FY 1991 funding. Construction will be underway.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 197	$ 1,800	$ 3
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

DEPARTMENT OF ENERGY
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ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Multiprogram Energy Laboratories - Facilities Support
General Purpose Facilities

IV. B. Plant Funded Construction Project

1. Project title and location: 90-R-108 Central shops alteration and addition, Brookhaven National Laboratory (BNL), Upton, New York

Project TEC: $ 1,680
Start Date: FY 1990
Completion Date: FY 1991

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1990	$306	$306	$300
1991	$1,370	$1,370	$1,376
1992	$ 4	$ 4	$ 4

3. Narrative:

(a) This project provides for the construction of a new building having a gross area of about 11,400 sq. ft. and an approximate volume of 185,000 cubic feet. It will provide for the construction of a new addition to the existing Heavy Machine Shop.

(b) The Central Shops Division currently has its welding operations contained in various World War II wooden buildings, most of which were not designed for their current use. This project will consolidate these operations into appropriately designed noncombustible facilities which will result in much safer and efficient operations. The existing building will be demolished.

(c) $1,370,000 is requested for FY 1991 funding. Construction will be completed.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction.....	$ 0	$ 0	$ 306	$ 1,370	$ 4
Capital Equipment.....	0	0	0	0	0
Operating Expenses.....	0	0	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Multiprogram Energy Laboratories - Facilities Support
General Purpose Facilities

IV. B. Plant Funded Construction Project

1. Project title and location: 90-R-107 Boiler replacement, Brookhaven National Laboratory (BNL), Upton, New York

Project TEC: $ 3,520
Start Date: FY 1990
Completion Date: FY 1992

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1990	$319	$319	$200
1991	$3,196	$3,196	$770
1992	$5	$5	$2,550

3. Narrative:

(a) This project provides for the installation of a new boiler, of about 125,000 lbs. per hour, at the Central Steam Facility.

(b) The boiler replacement is required to assure adequate firm capacity to meet the laboratory's 1991 steam demands.

(c) $3,196,000 is requested for FY 1991 funding. Construction will be underway.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction.....	$ 0	$ 0	$ 319	$ 3,196	$ 5
Capital Equipment.....	0	0	0	0	0
Operating Expenses.....	0	0	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(Dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Multiprogram Energy Laboratories - Facilities Support
General Purpose Facilities

IV. B. Plant Funded Construction Project

1. Project title and location: 90-R-100 Transportation facility replacement, Argonne National Laboratory (ANL), Argonne, Illinois

Project TEC: $ 4,100
Start Date: FY 1990
Completion Date: FY 1992

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1990	$345	$345	$150
1991	$1,400	$1,400	$1,470
1992	$2,355	$2,355	$2,480

3. Narrative:

(a) This project will provide a new building to house the activities of the Transportation and Grounds Service groups at ANL's Illinois site. The facility will centralize the Vehicle Maintenance and Repair, Driving and Rigging, and Grounds Maintenance activities into one facility.

(b) The purpose of this project is to relocate and consolidate the site's Transportation and Grounds Maintenance operations to correct existing facility deficiencies and provide an efficient centralized operational base. All existing facilities which are quonset buildings constructed to serve as temporary quarters during construction of Argonne in 1948 will be demolished.

(c) $1,400,000 is requested for FY 1991 funding. Construction will be underway.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 345	$ 1,400	$ 2,355
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET
OFFICE OF ENERGY RESEARCH
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Multiprogram Energy Laboratories - Facilities Support
General Purpose Facilities

IV. B. Plant Funded Construction Project

1. Project title and location: 88-R-807 Electrical System Rehabilitation, Phase I
Argonne National Laboratory (ANL)
Argonne, Illinois

Project TEC: $ 5,060
Start Date: FY 1988
Completion Date: FY 1991

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1988	$ 350	$ 350	$ 47
1989	1,150	1,150	345
1990	2,662	2,662	2,990
1991	860	860	800
1992	38	38	878

3. Narrative:

(a) This project provides for the replacement of components of the main electrical distribution system including transformers, voltage regulators, circuit breakers, metering and relaying equipment, poles, cross arms, insulators, down-guys and related hardware. The project also provides oil containment structures for oil transformers in accordance with current federal/state EPA regulations.

(b) Electrical reliability is essential to continuity of laboratory operations. This project will help ensure uninterruped operations by replacing transformers and other critical electrical equipment which are beyond their predicted life expectancy. Replacing them before failure will avoid costly and disruptive emergency repairs. Oil containment structures will bring existing operations into compliance with environmental regulations.

(c) $860,000 is requested for FY 1991 funding to complete this project.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction.....	$ 350	$ 1,150	$ 2,662	$ 860	$ 38
Capital Equipment.....	0	0	0	0	0
Operating Expenses.....	0	0	0	0	0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Multiprogram Energy Laboratories - Facilities Support
General Purpose Facilities

IV. B. Plant Funded Construction Project

1. Project title and location: 88-R-906 Environmental Health & Safety Project
Lawrence Berkeley Laboratory
Berkeley, California

Project TEC: $ 9,250[a/]
Start Date: FY 1988
Completion Date: FY 1991

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1988	$ 850	$ 850	$ 50
1989	2,516	2,516	580
1990	4,310	4,310	1,990
1991	1,512	1,512	3,844
1992	62	62	2,780

3. Narrative:

(a) This project will consist of several subprojects in the following areas: 1) upgrading and/or installing environmental monitoring equipment (air sampling/monitoring and underground fuel tank monitoring); 2) replacing existing deteriorated safety and health equipment (ventilation improvements and replacing drum storage racks); and 3) installing additional health and safety equipment, facilities and systems (area lighting and chemical storage facility).

(b) Ensuring healthy, safe and environmentally sound operations is a major goal at LBL. This project is needed to comply with state and national environmental requirements and safety and health standards.

(c) $1,512,000 is requested for FY 1991 funding to complete this project.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction.....	$ 850	$ 2,516	$ 4,310	$ 1,512	$ 62
Capital Equipment.....	0	0	0	0	0
Operating Expenses.....	0	0	0	0	0

[a/] Remaining balance of $1,075,000 transferred to new Office of Environmental Management.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Multiprogram Energy Laboratories - Facilities Support
General Purpose Facilities

IV. B. Plant Funded Construction Project

1. Project title and location: 87-R-753 Rehabilitate Laboratory Space
Argonne National Laboratory (ANL)
Argonne, Illinois

Project TEC: $12,035
Start Date: FY 1987
Completion Date: FY 1991

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1987	$ 1,235	$ 1,235	$ 521
1988	3,880[a/]	3,880[a/]	1,354
1989	2,800	2,800	1,992
1990	2,574	2,574	4,208
1991	1,500	1,500	3,007
1992	37	37	953

3. Narrative:

(a) This project will renovate six laboratory/office wings (166,000 gross square feet) of Building 200, a multipurpose laboratory and office building in the central part of the ANL site. The project will: 1) replace or upgrade the electrical distribution and lighting systems, the heating, ventilation and air conditioning systems and the plumbing and piping systems; and 2) repair and upgrade the building envelope (especially windows) and building interiors (ceiling, walls and doors).

(b) Building 200 has been in continuous use since its construction in 1951. There has been no renovating or reconditioning of this space since its construction so building systems have deteriorated and are not fully reliable or effective. The facility does not meet current construction codes and safety standards.

(c) $1,500,000 is requested for FY 1991 funding to complete this project.

4. Total Project Funding (BA):	Prior Years	FY 1988	FY 1990	FY 1991 Request	To Complete
Construction.....	$ 5,124	$ 2,800	$ 2,574	$ 1,500	$ 37
Capital Equipment.....	0	0	0	0	
Operating Expenses.....	0	0	0	0	

a/ $280,000 reprogrammed from prior year closed out projects.

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SUPPORTING SERVICES

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DEPARTMENT OF ENERGY

FISCAL YEAR 1991 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

SUPPORTING SERVICES

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

. OVERVIEW

IN-HOUSE ENERGY MANAGEMENT

The goal of the In-house Energy Management Program is to reduce energy consumption and utility/energy costs for the Department's facilities. As such, the program supports all mission areas. The program is structured to survey and study facilities and processes owned by the Department in order to identify retrofits and modifications to Departmental facilities which save energy and have a high return on investment. Projects identified are competed on a DOE-wide basis and are selected to maximize the Department's economic return.

Recent significant accomplishments include:

- o $2,000,000 was invested in FY 1989 for surveys and studies to identify retrofit projects for future funding and to identify no or low cost operational changes to reduce current energy consumption.
- o Sixty-four projects were funded in FY 1989 which, when complete will have a payback of 2.9 years.
- o FY 1988 energy consumption per square foot in DOE buildings has been reduced by 4.0 percent as compared to FY 1985. Public Law 100-115 of November 1988, requires a Federal buildings energy reduction of 10 percent by 1995 as compared to 1985 baseline (1 percent each year).
- o FY 1988 energy consumption per square foot in DOE metered processes has been reduced by 12.7 percent as compared to FY 1985.

Specific objectives for FY 1991 to FY 1995 are:

- o To reduce energy consumption per square foot in DOE buildings by 1 percent each year.
- o To reduce energy consumption per square foot in DOE metered processes by 1 percent each year.
- o To identify and fund additional retrofit projects with a high rate of return on investment as required by the National Energy Conservation Policy Act, Public Law 95-619, in order to improve the energy efficiency and reduce the operating costs of the Department of Energy.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ASSISTANT SECRETARY, MANAGEMENT AND ADMINISTRATION
(dollars in thousands)

LEAD TABLE

In-house Energy Management

Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Base	FY 1991 Request	Program Change Request vs Base	
					Dollar	Percent
In-house Energy Management						
Operating Expenses	$ 2,000	$ 1,992	$ 1,992	$ 3,540	$ +1,548	+78%
Construction	17,432	17,482	17,482	17,000	-482	-3%
Subtotal, In-house Energy Management	$ 19,432	$ 19,474	$ 19,474	$ 20,540	$ +1,066	+5%
TOTAL	$ 19,432	$ 19,474	$ 19,474	$ 20,540	$ +1,066	+5%
Summary						
Operating Expenses	$ 2,000	$ 1,992	$ 1,992	$ 3,540	$ +1,548	+78%
Construction	17,432	17,482	17,482	17,000	-482	-3%
Total Program	$ 19,432	$ 19,474	$ 19,474	$ 20,540	$ +1,066	+5%
Staffing (FTE's)	0	0	0	0		

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

In-house Energy Management

FY 1990 Appropriation	$19,474
Adjustments - Pay cost supplemental	0
FY 1991 Base	19,474
Operating Expenses	
- Increase level of funding for surveys studies and utility site assessments to identify retrofit projects	+ 1,548
Construction	
- Increase funding for Modifications for Energy Management project to provide additional small retrofit projects	+ 1,788
- Eliminate funding for Convert Boiler No. 4 to Coal Firing Argonne National Laboratory - FY 1990 funding completed project	- 2,270
FY 1991 Congressional Budget Request	$20,540

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

IN-HOUSE ENERGY MANAGEMENT

I. Preface: In-house Energy Management

The goal of the In-house Energy Management Program is to reduce energy consumption and utility/energy costs for the Department's facilities. As such, the program supports all mission areas. The program is structured to survey and study facilities, utilities and processes owned by the Department in order to identify retrofits and modifications to Departmental facilities which save energy and have a high return on investment. Projects identified are competed on a DOE-wide basis and selected to maximize the Department's economic return. Continuation of an annual program of quick payback retrofit projects for the Department's facilities reduces outyear utility costs, provides a rate of return exceeding 30 percent on the dollars invested and will meet goals set by legislation.

II. A. Summary Table: In-house Energy Management

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Surveys, Studies, and Utility Site Assessments..	$ 2,000	$ 1,992	$ 3,540	+ 78
Energy Conservation Retrofit and Central Plant Projects.....	17,432	17,482	17,000	- 3
Total, In-house Energy Management	$ 19,432	$ 19,474	$ 20,540	+ 5

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
In-house Energy Management			
Surveys, Studies, and Utility Site Assessments	Continued program of surveys and studies to identify retrofit projects for future funding and to identify no or low cost operational changes to reduce energy consumption.	Continue program of surveys and studies to identify retrofit projects for future funding.	Increase the level of funding for surveys, studies, and utility site assessments to identify retrofit projects for future funding.
	$ 2,000	$ 1,992	$ 3,540
Energy Conservation Retrofit and Central Plant Projects	Seventy projects were funded, which, when complete, will have a payback of 2.6 years.	Fund less than 75 retrofit projects, which, when complete, will have a payback of approximately 3 years. Fund line item Convert Boiler No. 4 to Coal Firing at the Argonne National Laboratory. This project has a payback of 3.2 years and a savings to investment ratio of 6.2.	Fund approximately 75 small retrofit energy conservation retrofit projects, which, when complete, will have a payback slightly greater than 3 years.
	$ 17,432	$ 17,482	$ 17,000
In-house Energy Management	$ 19,432	$ 19,474	$ 20,540

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(Obligations in thousands of dollars)

OBJECT CLASS SUMMARY

In-house Energy Management

Direct Funding:		FY 1989	FY 1990	FY 1991
11.1	Full-time permanent			
11.3	Other than full-time			
11.5	Other compensation			
11.9	Total personnel compensation			
12.1	Benefits			
21.0	Travel			
23.1	Rental Payments to GSA			
23.2	Rental Payments to Others			
25.0	Other Services	$ 2,000	$ 1,992	$ 3,540
31.0	Equipment	16,000	16,000	15,000
32.0	Land & Structure	1,432	1,482	2,000
99.0	Subtotal	19,432	19,474	20,540
	Reimbursables	0	0	0
Totals		$19,432	$19,474	$20,540

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ASSISTANT SECRETARY, MANAGEMENT AND ADMINISTRATION
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

In-house Energy Management

IV. B. Plant Funded Construction Project

1. Project title and location: 91-E-500 Modifications for Energy Management, Various Location

Project TEC: $17,000
Start Date: 2nd Qtr. FY 1991
Completion Date: 3rd Qtr. FY 1994

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1991	$17.000	$17,000	$1,700
1992			5,950
1993			5,950
1994			3,400

3. Narrative:

This line item is for various small retrofit projects to reduce energy consumption. These small modifications will be selected on the basis of return on investment and energy savings. Project compete on a DOE-wide basis for funding under this lump sum item, thus assuring the greatest return and greatest energy savings per investment dollar for the Department. The average payback for this line item based on past experience, is less than 3 years.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction.....	$ 0	$ 0	$ 0	$17,000	$ 0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET
ENERGY SUPPLY RESEARCH AN DEVELOPMENT

OVERVIEW

TECHNICAL INFORMATION MANAGEMENT PROGRAM

The Department of Energy (DOE) must ensure that the scientific and technical information (STI) resulting from the Agency's multibillion dollar research and development (R&D) investment is effectively managed, controlled, and disseminated, and that management of STI is considered an integral part of the R&D process from the initial planning stage through project completion. It must also ensure that Departmental elements managing and carrying out the Agency's R&D programs have access to the STI needed to perform their work, regardless of the source, and that STI is shared with other Government agencies and the private sector as appropriate.

The Scientific and Technical Information Program (STIP) represents a Department-wide approach to managing STI and is carried out at many levels within the Department and by its contractors.

Within the DOE infrastructure, the Office of Scientific and Technical Information (OSTI), through implementation of the Technical Information Management Program (TIMP), provides direction and leadership for the Department's STIP and furnishes a centralized base of support to assist Departmental elements in producing, managing, and disseminating their STI, when such support is determined to be in the best economic and programmatic interests of the Department.

To fulfill these responsibilities, the TIMP operates in support of four major objectives:

- o To coordinate the establishment, communication, and implementation of policy, procedures, and standards for managing STI in the Department;
- o To manage and provide access to energy and nuclear defense STI;
- o To provide advice and assistance to DOE Program offices in planning, developing, and implementing STIP activities; and
- o To represent the Department and participate in interagency, international, and domestic STI activities

Some of OSTI's major accomplishments during FY 1989 include:

- Continued to operate a centralized program that coordinates the management of STI within the Department and provides a resource for Departmental elements to utilize in planning, developing, and implementing STI activities.

- Designed, developed, and implemented a computerized prototype management system for capturing and using data related to nuclear facilities incidents. This system contains data on Savannah River incidents, and expansion to other reactor sites is anticipated.

- Developed a DOE-wide plan in coordination with other Departmental elements to implement control of computer software dissemination to sensitive countries.

- Developed and implemented a real-time on-line contract data system that resulted in improved receipt of contract STI deliverables and timely deobligation of unused funds.

- Continued to operate an effective program for acquiring foreign research results on behalf of the Department, including serving as Operating Agent for the International Energy Agency's Energy Technology Data Exchange.

- Continued to expand access to DOE's on-line classified network, providing for effective and secure communications linkage between classified data resources and the agency's defense laboratories.

Specific objectives for FY 1990 through FY 1994 include:

- Investigate, and implement as appropriate, the application of new and emerging technologies to the Department's information management program and related activities.

- Pursue the exploitation of data contained in DOE bibliographic data files to take advantage in non-traditional ways of the vast amounts of intelligence they contain.

- Implement systems and procedures for the segmentation of STI to effectively meet Departmental objectives relating to national security and U.S. competitiveness.

- Actively promote the development and utilization of common policies and standards to facilitate the compatibility, transferability, and usability of STI throughout the Department and among other government agencies.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

LEAD TABLE

Technical Information Management Program

Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
Technical Information Management Program						
Operating Expenses	$13,100	$13,656	$13,850	$14,100	$+250	+2
Capital Equipment	900	937	950	900	-50	-5
Construction	2,500	197	200	0	-200	-100
Budget Authority	$16,500	$14,790	$15,000	$15,000	0	0
Staffing (FTEs)	173	175	175	175		

Authorization: Section 31, P.L. 83-703

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Technical Information Management Program

FY 1990 Appropriation Request	$14,790
Adjustments - Gramm-Rudman-Hollings	+210
- Pay cost supplemental	0
FY 1991 Base	$15,000
Contractual Services and Supplies	
- Escalation increases	+480
- Decrease project to prevent further deterioration of official R&D records	-280
Construction	
- Eliminate General Plant Projects (GPP)	-200
FY 1991 Congressional Budget Request	$15,000

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

TECHNICAL INFORMATION MANAGEMENT PROGRAM

I. Preface: Technical Information Management Program

The Scientific and Technical Information Program (STIP) represents a Department-wide approach to managing STI and is carried out at many levels within the Department and by its contractors. Within the DOE infrastructure, the Office of Scientific and Technical Information (OSTI), through implementation of the Technical Information Management Program (TIMP), is responsible for providing direction and leadership for the Department's STIP, and for furnishing a centralized base of support to assist Departmental elements in producing, managing, and disseminating their STI, when such support is determined to be in the best economic and programmatic interests of the Department. To accomplish this role, OSTI performs a number of specific activities in support of four major TIMP objectives:

- o Providing direction for the development, communication, and coordination of policy, procedures, and standards for managing STI in the Department.
- o Acquiring, managing, and providing access to civilian energy and national defense STI.
- o Providing consultation and assistance to Departmental Elements in planning, developing, and implementing STIP activities.
- o Representing the Department and participating in interagency, international, and domestic STI activities.

II. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	$ Change
Operating Expenses	$ 13,100	$ 13,656	$ 14,100	+3
Capital Equipment	900	937	900	-4
Construction	2,500	197	0	-100
Budget Authority	$ 16,500	$ 14,790	$ 15,000	+1

II. B. Major Laboratory and Facility Funding

Oak Ridge National Laboratory	$90	$50	$30	-40

III. Operating Expenses (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Acquisition and Appraisal	Provides for contract services to acquire and evaluate scientific and technical information which is made available to DOE scientists and engineers, and to meet requirements of certain international exchange agreements. ($1,100)	Continue same level of acquisition and evaluation services. ($1,100)	Continue FY 1990 level of acquisition and evaluation services, plus escalation. ($1,180)
Systems and Technology	Provides for contract services required to develop, build, and maintain information systems and to manage and provide automated access to scientific and technical information. ($2,600)	Continue same level of services. ($2,550)	Continues same level of services as in FY 1990, plus escalation. ($2,780)
Products and Services	Provides for contractor production support services, and supplies required to produce and make available the results of DOE's energy research and development program. ($1,800)	Continue essentially same level of products and services, including plans to upgrade protection of official DOE R&D records. ($2,106)	Continue essentially same level of services as in FY 1990. ($1,950)
Subtotal Operating Expenses	$13,100	$13,656	$14,100

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III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
Capital Equipment	Provides for ADP and duplicating equipment to support DOE's centralized technical information activities. ($900)	Maintain essentially same level of equipment as FY 1989. ($937)	Maintains same level of equipment as FY 1989. ($900)
Subtotal Capital Equipment	$ 900	$ 937	$ 900
Construction	Provides for line item construction project for the upgrading of the OSTI facility to meet environmental, health, safety, and security requirements; enhance archival storage capabilities; and extending the serviceable life of the facility. ($2,500)	Provides for miscellaneous General Plant Projects (GPP). ($197)	0
Subtotal Construction	$ 2,500	$ 197	$ 0
Total	$16,500	$14,790	$15,000

III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
Operating Expenses			
Program Direction	Provides for facility services and for FTEs required to implement and operate the TIMP, including: collecting, organizing, analyzing, and disseminating R&D results in accordance with DOE policy; managing DOE's Master file of worldwide energy information; designing, developing, and operating systems to control dissemination of classified and sensitive information; maintaining a database on energy-related research in progress; providing guidance, assistance, and support to DOE program managers in managing, controlling, and disseminating their scientific and technical information (STI); recommending and participating in the development of policy, standards, and procedures for DOE's STI program; negotiating and implementing bilateral and multilateral agreements for domestic and international exchange of energy information; monitoring receipt of information deliverables from DOE-funded R&D contracts; and providing tools to assist in controlling the flow of information abroad. ($7,600)	Continue to provide facility services and FTEs required to implement and operate TIMP. ($7,900)	Maintain same level of facility services and FTEs as described for FY 1990 plus escalation of contractual services and supplies. ($8,190)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Technical Information Management Program

IV. A. Construction Project Summary

Project No.	Project Title	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Unappropriated Balance	TEC
90-LA-1	Miscellaneous GPP	---	$197	---	---	$197

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS SUMMARY

Technical Information Management Program

		FY 1989	FY 1990	FY 1991
Direct Funding:				
11.1	Full-time permanent	$5,504	$ 5,738	$ 5,982
11.3	Other than full-time	372	387	404
11.5	Othen compensation	109	131	136
11.9	Total personnel compensation	5,985	6,256	6,522
12.1	Benefits	1,006	1,173	1,286
21.0	Travel	145	145	145
25.0	Other services	5,964	6,082	6,147
31.0	Equipment	900	937	900
32.0	Land and Structure	2,500	197	0
99.0	Subtotal	16,500	14,790	15,000

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT

OVERVIEW

STRATEGIC FACILITIES UTILIZATION PROGRAM

FY 1991 will complete the last year of funding for the Strategic Facilities Utilization Program (SFUP). The program is intended to save maintenance dollars by disposing of facilities that are no longer needed. SFUP helped highlight the Department's need for better data from which to create an integrated capital assets management program. For FY 1991, therefore, SFUP will be completed with a Condition Assessment Survey (CAS). Using a consistent set of criteria department wide, perform a one-time survey of DOE sites to determine which facilities are in need of replacement, refurbishment or demolition. Actual work on the facilities will be then be funded through the operating programs.

Once CAS has provided a baseline, specific replacement projects will be funded by the respective outlay programs. The programs will also be required to fund the demolition of facilities which are no longer required.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ASSISTANT SECRETARY, MANAGEMENT AND ADMINISTRATION
(dollars in thousands)

LEAD TABLE

Strategic Facilities Utilization Program

Activity	FY 1989 Actual	FY 1990 * Estimate	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
Strategic Facilities Utilization Program						
Operating Expenses	$ 1,977	$ 1,949	$ 1,949	$ 3,000	$ +1,051	+54%
Construction	198	195	195	0	-195	-100%
Subtotal, Strategic Facilities Utilization Program	$ 2,175	$ 2,144	$ 2,144	$ 3,000	$ +856	+40%
TOTAL	$ 2,175	$ 2,144	$ 2,144	$ 3,000	$ +856	+40%
Summary						
Operating Expenses	$ 1,977	$ 1,949	$ 1,949	$ 3,000	$ +1,051	+54%
Construction	198	195	195	0	-195	-100%
Total Program	$ 2,175	$ 2,144	$ 2,144	$ 3,000	$ +856	+40%
Staffing (FTE's)	0	0	0	0		

*FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and P.L. 101-164 reductions to fund anti-drug activities.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Strategic Facilities Utilization Program

FY 1990 Appropriation	$ 2,144
FY 1991 Base	2,144
Strategic Facilities Utilization Program	
- Using a consistent set of criteria department wide, perform a one-time survey of DOE sites to determine which facilities are in need of replacement, refurbishment or demolition. Actual work on the facilities will then be funded through the operating programs	+ 856
FY 1991 Congressional Budget Request	$ 3,000

849

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

STRATEGIC FACILITIES UTILIZATION PROGRAM

I. Preface: Strategic Facilities Utilization Program

There are approximately 25,000 buildings and other structures in the DOE inventory. These facilities include accelerators, reactors, office structures, laboratories, shops, steam plants, roads, railroads, cafeterias, computer buildings, parking lots, utilities and hundreds of other categories. As our facilities have aged, unsafe conditions, loss-time delays, and more frequent and costly maintenance have increased dramatically. In FY 1991, the shortfall in maintenance will have grown to approximately $450 million.

A Condition Assessment Survey (CAS) will provide consistent DOE-wide facility assessments. These analyses will address the remaining useful lives of individual facilities. An experienced facility engineering contractor will be asked to develop state-of-the-art procedures, training, hardware, software, and quality assurance.

II. A. Summary Table: Strategic Facilities Utilization Program

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Strategic Facilities Utilization Program.....	$ 2,175	$ 2,144	$ 3,000	+ 40
Total, Strategic Facilities Utilization Program	$ 2,175	$ 2,144	$ 3,000	+ 40

850

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Strategic Facilities Utilization Program	The Strategic Facilities Utilization Program funded approximately 30 projects with total payback in less than 4 years. These projects included over 100 facilities at 15 sites. Most projects demolished or disposed of marginal facilities; the remainder involved mothballing, cancelling leases, etc.	The Strategic Facilities Utilization Program is funding approximately 30 projects with a total payback of less than 4 years. They will include demolition and disposal of marginal facilities, lease cancellations, conversions and mothballing. The projects will include a cross-section of DOE field locations and programs.	Funding for a Condition Assessment Survey (CAS). A contractor will develop standards and methods to assess all of the Department's facilities. The assessment will form the basis for future repair-replace-or-demolish decisions.
	$ 2,175	$ 2,144	$ 3,000
Strategic Facilities Utilization Program	$ 2,175	$ 2,144	$ 3,000

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(obligations dollars in thousands)

OBJECT CLASS SUMMARY

Strategic Facilities Utilization Program

Direct Funding:		FY 1989	FY 1990	FY 1991
25.0	Other Services.....	$ 2,175	$ 2,144	$ 3,000
99.0	Totals.....	$ 2,175	$ 2,144	$ 3,000

852

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT

OVERVIEW

POLICY AND MANAGEMENT - ENERGY RESEARCH

This program provides the staffing resources and associated funding required to provide overall direction of the Office of Energy Research responsibilities carried out under the other specific programs as follows: High Energy Physics, Nuclear Physics, Superconducting Super Collider, Biological and Environmental Research, Magnetic Fusion Energy, Basic Energy Sciences, Energy Research Analyses, University and Science Education, University Research Instrumentation, Multiprogram Energy Laboratories-Facilities Support and the DOE-wide Small Business Innovation Research Program. The staff budgeted in this program also manages and directs the Federal staffs budgeted within the above programs which contribute to the accomplishment of national goals.

In addition to directing the Office's research programs, the Director, Energy Research, also serves as the Department's principal science advisor for formulation of basic research policy. In this capacity, the Director provides independent reviews, analyses and recommendations concerning a wide range of activities which require scientific counsel. These activities include national research and development strategies, plans and policies, including the establishment of budgetary priorities for energy research and development programs. They also include advising on policy issues regarding the best utilization of the nonweapons multiprogram laboratories assigned to the Office of Energy Research for oversight and management.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

LEAD TABLE

Policy and Management - Energy Research

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs Base	
					Dollar	Percent
Policy and Management Operating Expenses.....	$667	$665 a/	$850	$850	-	-
Staffing (FTE's).....	9	8	8	8		

Authorization: Section 209, P.L. 95-91.

a/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Policy and Management - Energy Research

FY 1990 Appropriation	$ 665
Adjustments - Increased Personnel Costs	+ 185
FY 1991 Base and Congressional Budget Request	$ 850

855

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

POLICY AND MANAGEMENT - ER

I. Preface: Policy and Management - ER

This program provides the staffing resources and associated costs of the immediate Office of the Director of Energy Research, which is required to provide overall direction of the Office of Energy Research responsibilities carried out under the other specific programs as follows: High Energy Physics, Nuclear Physics, Superconducting Super Collider, Biological and Environmental Research, Magnetic Fusion Energy, Basic Energy Sciences, Energy Research Analyses, University and Science Education, University Research Instrumentation, Multiprogram Energy Laboratories-Facilities Support, and the DOE-wide Small Business Innovation Research Program. The staff budgeted in this program also provides management direction to the Federal staffs budgeted within the above programs which contribute to the accomplishment of national goals.

II. A. Summary Table: Policy and Management - ER

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Policy and Management - ER	$ 667	$ 685	$ 850	+ 28
Total, Policy and Management - ER	$ 667	$ 685	$ 850	+ 28

856

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Policy and Management - ER	Provided funds for salaries, benefits, and travel for nine full-time equivalents (FTE's) in the Immediate Office of the Director of Energy Research. Directed the Office's research programs and served as the principal science advisor in formulating basic research policy. Developed and implemented uniform policy and procedures for coordination and management of ER's continually increasing international activities. ($642)	Provide funds for salaries, benefits, and travel to provide for eight FTE's in the Office of the Director of Energy Research. ($640)	Provide funds for salaries, benefits, and travel to continue the level of eight FTE's in the Office of the Director of Energy Research. Provide for normal increased personnel costs resulting, for example, from within-grade and merit increases and the impact of the FY 1990 general and executive pay raises. ($810)
	Provided for training and other support costs of Office of Energy Research employees. ($25)	Provide for training costs of Office of Energy Research employees. ($25)	Provide for training costs of Office of Energy Research employees and for support costs of Automated Office Support Systems workstations, including hotline support, hardware modifications, upgrades, moves and telecommunications/network support. ($40)
	$ 667	$ 665	$ 850
Policy and Management - ER	$ 667	$ 665	$ 850

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ASSISTANT SECRETARY FOR NUCLEAR ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

Policy and Management - Nuclear Energy

I. Preface. Policy and Management

The objective of the Policy and Management activity is to provide adequate staffing and financial resources for the Assistant Secretary, Nuclear Energy, and the supporting functions of policy development, program planning, resource management, program assessment, and international program control and liaison. In addition, this submission includes DOE personnel costs and associated contractor funding for Nuclear Energy being assigned the responsibility for both its internal oversight of nuclear safety aspects of all nuclear reactors and non-reactor-nuclear facilities under the cognizance of the Office of Nuclear Energy and the Department's nuclear safety policy role for nuclear reactors and non-reactor-nuclear facilities. This latter function includes the responsibilities to (1) develop, coordinate and interpret nuclear safety policy for all Department of Energy nuclear reactors and non-reactor nuclear facilities (other than for Naval Nuclear Propulsion Programs) and (2) establish, issue and maintain Department standards to implement such policy. These functions were previously performed by the Assistant Secretary for Environmental, Safety and Health and were assigned to the Assistant Secretary for Nuclear Energy by the Secretary. The FY 1991 funding request shown below covers these safety functions.

Included in this budget is the funding for the Advisory Committee on Nuclear Facility Safety, which was established by the Department in FY 1988 on the recommendation of the National Academy of Science. The Committee is chartered to provide the Secretary of Energy with advice and recommendations on the safety and environmental protection of the Department's sites and facilities. The Committee, supported by a DOE staff and consultants, is composed largely of recognized experts in the field of nuclear energy from outside the Department and are appointed by the Secretary under the Federal Advisory Committee Act. During FY 1991, continued emphasis will be placed on review of safety and environmental protection of DOE sites and facilities except those facilities and operations for which a specific request from the Secretary is required.

This budget also provides the technical and management expertise needed to direct and administer varied R&D and operational programs encompassing both civilian and defense activities. These efforts require the combined skills of technical managers, administrators, and clerical staff. The R&D activities encompass different technologies, at various stages of development, and are performed at different contractor locations to include national laboratories, universities, industrial concerns and foreign governments. The operational activities involving uranium enrichment are also performed at Oak Ridge, Tennessee, Paducah, Kentucky, and Portsmouth, Ohio. Defense activities include the Naval Reactors development program at Pittsburgh, Pennsylvania, Schenectady, New York; and Idaho Falls, Idaho. The funding provides financial resources (i.e., salary, benefits, travel etc.) to enable the Assistant Secretary and the office staff to perform the requisite functions of the organization. The required funds will permit performance of program and policy reviews at contractor or field office locations, program control and liaison of international agreements, interaction with Congressional, OMB, and other Departmental elements, involvement with nuclear energy source selection boards, attendance at public meetings either sponsored by the Department or others, furtherance of employee development, and participation in the employment cycle. This latter effort includes invitational travel and change of station orders. With respect to change of station, the requested funds cover employee and family transportation costs, per diem costs, and temporary quarters costs. Computer acquisition and operations support are covered as are contractor personnel to supplement the Federal staffing levels.

II.A. Summary Table

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request	% Change
Personnel compensation	$ 1,240	$ 1,000	$ 4,080	+308
Personnel benefits: Civilian	345	120	440	+267
Travel and transportation of persons	100	80	320	+300
Other services	680	959	24,981	+2,478
Advisory Committee on Nuclear Facility Safety	3,900	2,969	3,100	+5
Total	$ 5,165 a/	$ 5,128 a/	$ 32,921	+542
II.B. Major Laboratory and Facility Funding				
Headquarters	$5,165	$5,128	$32,921	+542

a/ Does not a reflect comparability adjustment for Nuclear Energy's newly assigned nuclear safety functions.

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III. Activity Description:

	FY 1989	FY 1990	FY 1991
Personnel Compensation	Using FY 1989 appropriations, salaries and awards were covered for the usage of 22 FTEs for the Office of the Assistant Secretary and the Program Support Offices of Plans and Evaluation, Resource Management and International Programs. $1,240	This estimate reflects funding required for salaries and awards for 15 FTEs for the Office of the Assistant Secretary and the Program Support Offices of Plans and Evaluation, Resource Management and International Programs. Continuation of our FY 1989 efforts, which supported over 20 major Congressional hearings, program control/liaison of more than $40 million in international agreements, major system acquisition/major projects in excess of $2 billion Total Project Costs, the responses to more than 1,500 pieces of public/Congressional mail, is expected ($1,000). Funding for additional 40 FTEs for Nuclear Energy's newly assigned Internal Nuclear Safety Oversight and Departmental Nuclear Facility Safety Policy functions is covered with $2 million prior year carryover funds. $1,000	This request reflects funding required for salaries and awards for 15 FTEs for the Office of the Assistant Secretary and the Program Support Offices of Plans and Evaluation, Resource Management and International Programs. Continuation of our FY 1990 efforts, which supported over 20 major Congressional hearings, program control/liaison of more than $40 million in international agreements, major system acquisition/major projects in excess of $2 billion Total Project Costs, the responses to more than 1,500 pieces of public/Congressional mail, is expected ($1,000). Also reflected is a request for 40 additional FTEs and associated funding to cover the staff required for Nuclear Energy's newly assigned Internal Nuclear Safety Oversight and Departmental Nuclear Safety Policy functions ($3,080). $4,080
Benefits	During FY 1989, employees' personnel benefits and some Federal Employee Retirement System contributions were accrued. $145	In FY 1990, employees' personnel benefits and added Federal Employee Retirement System contributions will be accrued. $120	During this period, employees' personnel benefits and added Federal Employee Retirement System contributions are expected to be accrued. $440
Travel	Includes funds for staff travel. $100	Includes funds for staff travel. $80	Includes funds for aff travel. $320

III. Activity Description: (Continued)

	FY 1989	FY 1990	FY 1991
Other Services	The funding in this area, in addition to carryover funds from prior years' ($360), provided miscellaneous contractor and university support ($110), funded Nuclear Energy's integrated computer support contractor ($500), provided computer work station support from the Office of Computer Services & Telecommunications Management in hardware acquisitions and modifications and software acquisitions ($150), and maintained a minimum work force with contractor/Federal personnel ($280). $680	The funding in this area, in addition to carryover funds from prior years' ($100), provides miscellaneous contractor and university support ($130), funds Nuclear Energy's integrated computer support contractor ($200), provides computer work station support from the Office of Computer Services & Telecommunications Management in hardware acquisitions and modifications and software acquisitions ($70), and maintains a minimum work force with contractor/Federal personnel ($669). $968	The funding in this area, in addition to carryover funds from prior years' ($100), provides miscellaneous contractor and university support ($130), funds Nuclear Energy's integrated computer support contractor ($200), and provides computer work station support from the Office of Computer Services & Telecommunications Management in hardware acquisitions and modifications and software acquisitions ($70). Also included in this request is contractor funding to support the newly assigned Internal Nuclear Safety Oversight and Departmental Nuclear Safety Policy functions. This funding includes the Unusual Occurrence Report data base, and training in nuclear occupational system safety techniques ($2,500); safety policy and standards including risk assessment and safety training and accreditation ($9,000); and facility operator training ($9,000). Also included is funding to maintain the minimum required work force with contractor/Federal personnel ($4,181). ($24,981)
Advisory Committee on Nuclear Facility Safety	Funding in this area was used to conduct monthly meetings, focused on priority safety issues at DOE's Class A reactors, the Waste Isolation Pilot Plant, and other support facilities. Committee and staff utilized 6 FTEs against a ceiling of 15 FTEs. Supporting technical consultants to investigate priorities were also covered. ($3,000)	Funding is included to expand on scope of activities essential to safety, conduct monthly meetings, and address new safety issues relative to non-nuclear facilities and operations. Committee expansion to address new issues and supporting DOE staff utilizing 21 FTEs, and technical consultants are also covered. ($2,359)	Based on expanded role, funding is included to review activities essential to safety measures. Emphasis on all DOE facilities other than defense production reactors and related process facilities. Committee and supporting DOE staff utilizing 21 FTEs, and technical consultants are also covered. ($3,100)
Total, Policy and Management (NE)	$5,165	$5,128	$32,921
FTE'S	30	76	76

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(in thousands of dollars)

LEAD TABLE

Policy and Management - Energy Supply, R & D

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Policy and Management - ESR&D Operating Expenses	$ 1,587	$ 1,541	$ 1,480	$ 1,668	$ +188	$ +13%
Subtotal	$ 1,587	$ 1,541	$ 1,480	$ 1,668	$ +188	$ +13%
TOTAL	$ 1,587	$ 1,541	$ 1,480	$ 1,668	$ +188	$ +13%
Summary Operating Expenses	$ 1,587	$ 1,541	$ 1,480	$ 1,668	$ +188	$ +13%
Total Program	$ 1,587 1/	$ 1,541 2/	$ 1,480	$ 1,688	$ +188	$ +13%
Staffing (FTE's)	12	15	15	15		

Authorization:
- P.L. 95-91, "Department of Energy Organization Act," Section 20

1/ FY 1989 Appropriation totaled $1,763 of which $176 was reprogrammed to support Solar Energy Program Direction.

2/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and P.L. 101-164 reductions to fund anti-drug activities.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Policy and Management

FY 1990 Appropriation	$ 1,563
Adjustments	-22
FY 1991 Base	$ 1,541
Operating Expenses	
The increase is attributed to contractual services	+127
FY 1991 Congressional Budget Request	$ 1,668

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26-657 O—90—29

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY, RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

POLICY AND MANAGEMENT - ESR&D

I. Preface: Policy and Management - ESR&D

Staffing levels provide the executive and overall program direction for all CE programs to ensure effective management. These activities include executive management, policy formulation, program review and approval, and liaison with senior officials in DOE, White House, Congressional, OMB, other departmental agencies, private industry, and State and local governments. In addition, the staff will carry out analyses of the CE programs needed to assess performance and effectiveness.

II. A. Summary Table: Policy and Management - ESR&D

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Salaries, Contractual Services	$ 1,587	$ 1,541	$ 1,668	+ 8
Total, Policy and Management - ESR&D	$ 1,587	$ 1,541	$ 1,668	+ 8

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Policy and Management - ESR&D			
Salaries, Contractual Services	Policy and Management provides overall management guidance to Conservation and Renewable Energy (CE) programs. Provides 12 FTEs for liaison with senior officials in DOE, Congress, the White House, OMB, and other agencies as well as State and local governments. Provides analyses of CE programs needed to assess performance and effectiveness.	Policy and Management provides overall management guidance to Conservation and Renewable Energy (CE) programs. Provides 15 FTEs for liaison with senior officials in DOE, Congress, the White House, OMB, and other agencies as well as State and local governments. Provides analyses of CE programs needed to assess performance and effectiveness.	Policy and Management provides overall management guidance to Conservation and Renewable Energy (CE) programs. Provides 15 FTEs for liaison with senior officials in DOE, Congress, the White House, OMB, and other agencies as well as State and local governments. Provides analyses of CE programs needed to assess performance and effectiveness. Includes 4 FTEs to provide executive management of the Alcohol Fuels Loan Guarantee program.
	$ 871	$ 986	$ 986
	Provides for contract support to assist in CE-wide planning, policy development, program planning evaluation, budget formulation and execution, personnel management, and administrative support.	Provides for contract support to assist in CE-wide planning, policy development, program planning evaluation, budget formulation and execution, personnel management, and administrative support.	Provides for contract support to assist in CE-wide planning, policy development, program planning evaluation, budget formulation and execution, personnel management, and administrative support.
	$ 716	$ 555	$ 682
Policy and Management - ESR&D	$ 1,587	$ 1,541	$ 1,668

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(Obligations in thousands of dollars)

OBJECT CLASS SUMMARY

Policy and Management

Direct Funding:	FY 1989	FY 1990	FY 1991
11.1 Full-time permanent	$636	$732	$732
11.3 Other than full-time permanent	0	0	0
11.5 Other personnel compensation	64	73	73
11.9 Total personnel compensation	700	805	805
12.1 Civilian personnel benefits	95	81	81
21.0 Travel and transportation of persons	76	100	100
25.0 Other services	716	555	682
31.0 Equipment	0	0	0
32.0 Land & structures	0	0	0
Totals	$1,587	$1,541	$1,668

DOE/MA-0098
Volume 3 of 5

United States Department of Energy
Fiscal Year 1991

Congressional Budget Request

Environmental Restoration and Waste Management
General Science and Research
Uranium Enrichment
Isotope Production and Distribution Fund
Nuclear Waste Fund

Volume 3

Assistant Secretary,
Management and Administration
Office of the Controller

January 1990

(867)

DEPARTMENT OF ENERGY

FISCAL YEAR 1991 CONGRESSIONAL BUDGET REQUEST

ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT

GENERAL SCIENCE AND RESEARCH

URANIUM ENRICHMENT

ISOTOPE PRODUCTION AND DISTRIBUTION FUND

NUCLEAR WASTE FUND

VOLUME 3

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Department of Energy
FY 1991 Congressional Request

Summary of Estimates by Appropriation
Budget Authority
(Dollars in Million)

	FY 1989 Actual	FY 1990 Approp.	FY 1991 Departmental Request
Appropriation Before the Energy and Water Development Subcommittees:			
Atomic Energy Defense Activities	$6,752,575	$7,722,905	$8,592,000
General Science and Research Activities	908,471	1,093,316	1,273,732
Isotope Production and Distribution Fund	(209)	16,016	0
Energy Supply Research and Development	1,848,973	1,892,087	2,085,237
Environmental Restoration and Waste Management	1,657,347	2,218,317	2,791,436
Uranium Supply and Enrichment Activities	(244,053)	(4,745)	0
FERC - Salaries and Expenses	108,760	114,918	122,750
Nuclear Waste Disposal Fund	366,832	295,156	292,833
Geothermal Resources Development Fund	75	74	80
Power Marketing Administrations:			
Alaska Power Administration	3,159	3,134	3,233
Bonneville Power Administration	159,517	258,200	170,100
Southeastern Power Administration	36,267	18,456	9,285
Southeastern - Continuing Fund	3,072	0	0
Southwestern Power Administration	15,389	25,257	20,107
Western Area Power Administration	271,145	294,218	298,464
Total, Power Marketing Administrations	488,549	599,065	501,189
Departmental Administration	213,848	202,185	224,427
Office of Inspector General	20,959	22,638	28,421
Total, Appropriation Before the Energy And Water Development Subcommittees	$12,122,127	$14,171,932	$15,912,105

Department of Energy
FY 1991 Congressional Request

Summary of Estimates by Appropriation
Budget Authority
(Dollars in Million)

	FY 1989 Actual	FY 1990 Approp.	FY 1991 Departmental Request
Appropriation Before the Interior and Related Agencies Subcommittees:			
Clean Coal Technology	187,800	554,000	456,000
Fossil Energy Research and Development	380,025	416,641	202,309
Naval Petroleum and Oil Shale Reserve	185,071	189,439	210,610
Energy Conservation	316,809	370,918	182,591
Energy Regulation	18,668	18,198	16,408
Emergency Preparedness	6,154	6,551	6,467
Strategic Petroleum Reserve	173,421	192,483	195,633
Strategic Petroleum Account	242,000	435,865	228,393
Energy Information Activities	62,856	64,319	66,608
Total, Appropriation Before the Interior and Related Agencies Subcommittees	1,572,804	2,248,414	1,565,019
Total, Appropriation Before the Energy and Water Development Subcommittees	12,122,127	14,171,932	15,912,105
Payment to States	2,249	2,249	2,343
Total, Department of Energy	$13,697,180	$16,422,595	$17,479,467

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1989 FTE USAGE	FY1990 -FY89	FY1990 CONGR REQ	FY1991 -FY90	FY1991 CONGR REQ
ENERGY & WATER SUBCOMMITTEE					
HEADQUARTERS	4,926	558	5,484	99	5,583
FIELD	9,480	-63	9,417	-179	9,238
SUBCOMMITTEE TOTAL	14,406	495	14,901	-80	14,821
INTERIOR SUBCOMMITTEE					
HEADQUARTERS	1,212	-42	1,170	-52	1,118
FIELD	917	12	929	-90	839
SUBCOMMITTEE TOTAL	2,129	-30	2,099	-142	1,957
GRAND TOTAL	16,535	465	17,000	-222	16,778
ADJUSTMENT				-16	-16
ADJUSTED TOTAL	16,535	465	17,000	-238	16,762

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1989 FTE USAGE	FY1990 -FY89	FY1990 CONGR RES	FY1991 -FY90	FY1991 CONGR RES
10:ENERGY SUPPLY RESEARCH AND DEV	936	118	1,076	7	1,083
HEADQUARTERS	678	119	797	7	804
FIELD	280	-1	279	0	279
15:URANIUM ENRICHMENT	62	5	67	0	67
HEADQUARTERS	52	4	56	0	56
FIELD	10	1	11	0	11
17:ISOTOPE PRODUCTION AND DISTRIB	0	2	2	0	2
HEADQUARTERS	0	2	2	0	2
20:GENERAL SCIENCE AND RESEARCH	69	37	84	112	98
HEADQUARTERS	69	37	84	112	98
25:ATOMIC ENERGY DEFENSE ACTIVITI	2,999	411	3,410	45	3,455
HEADQUARTERS	550	267	817	40	857
FIELD	2,449	144	2,593	5	2,598
27:ENV RESTORATION & WASTE MGT	68	113	181	29	291
HEADQUARTERS	68	36	96	20	116
FIELD	0	77	85	0	85
30:DEPARTMENTAL ADMINISTRATION	3,347	-200	3,147	0	3,147
HEADQUARTERS	1,692	-28	1,672	0	1,672
FIELD	1,655	-180	1,475	0	1,475
32:INSPECTOR GENERAL	189	51	240	16	256
HEADQUARTERS	189	51	240	16	256
34:ALASKA POWER ADMINISTRATION	31	4	35	0	35
FIELD	31	4	35	0	35
36:BONNEVILLE POWER ADMIN	3,310	-80	3,230	-100	3,130
FIELD	3,310	-80	3,230	-100	3,130
38:SOUTHEASTERN POWER ADMIN	38	2	40	0	40
FIELD	38	2	40	0	40
42:SOUTHWESTERN POWER ADMIN	184	-2	184	0	184
FIELD	184	-2	184	0	184
46:WAPA - POWER MARKETING	1,163	-20	1,143	-83	1,060
FIELD	1,163	-20	1,143	-83	1,060
50:WAPA - COLORADO RIVER BASIN	248	0	248	0	248
FIELD	248	0	248	0	248
52:FEDERAL ENERGY REGULATORY COMM	1,497	73	1,570	0	1,570
HEADQUARTERS	1,497	73	1,570	0	1,570
54:NUCLEAR WASTE FUND	268	-19	249	1	250
HEADQUARTERS	158	-11	147	4	151
FIELD	110	-4	102	-3	99
56:GEOTHERMAL RESOURCES DEV FUND	1	0	1	0	1
HEADQUARTERS	1	0	1	0	1
63:CLEAN COAL TECHNOLOGY	53	9	98	0	63
HEADQUARTERS	21	0	33	0	33
FIELD	32	9	65	0	30
65:FOSSIL ENERGY RESEARCH AND DEV	739	-22	717	-44	699
HEADQUARTERS	172	-35	137	-14	155
FIELD	567	13	580	-84	496
70:NAVAL PETROL & OIL SHALE RES	92	-3	89	2	91
HEADQUARTERS	19	-1	18	2	20
FIELD	73	-2	71	0	71
75:ENERGY CONSERVATION	339	13	352	-64	288
HEADQUARTERS	288	10	218	-47	171
FIELD	151	3	134	-17	117
80:EMERGENCY PREPAREDNESS	69	2	71	0	71
HEADQUARTERS	69	2	71	0	71
81:ECONOMIC REGULATION	235	-29	206	-25	181
HEADQUARTERS	235	-29	206	-25	181
83:STRATEGIC PETROLEUM RESERVE	140	0	140	4	144
HEADQUARTERS	26	-2	28	0	28
FIELD	114	-2	112	0	128
90:ENERGY INFORMATION ACTIVITIES	442	4	446	0	444
HEADQUARTERS	442	4	446	0	444
GRAND TOTAL	16,533	463	17,000	-222	16,778
ADJUSTMENT				-16	-16
ADJUSTED TOTAL	16,533	463	17,000	-238	16,762

VOLUME 3

ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT

7

DEPARTMENT OF ENERGY

FISCAL YEAR 1991 CONGRESSIONAL BUDGET REQUEST

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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT

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DEPARTMENT OF ENERGY

FY 1991 CONGRESSIONAL BUDGET REQUEST

PROPOSED APPROPRIATION LANGUAGE

ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT

For necessary expenses of the Department of Energy in carrying out environmental restoration and waste management activities, including the construction and acquisition of necessary plant and capital equipment, as authorized by the Department of Energy Organization Act (Public Law 91-95); $2,791,436,000, to remain, available until expended.

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Department of Energy
FY 1991 Congressional Request

Summary of Estimates by Major Activity
Environmental Restoration and Waste Management
Budget Authority
(Dollars in Million)

	FY 1989 Actual	FY 1990 Approp.	FY 1991 Departmental Request
Corrective Activities	$85,054	$124,754	$168,598
Environmental Restoration	419,682	656,829	882,420
Waste Management	1,095,279	1,247,703	1,652,312
Technology Development	51,832	183,481	206,000
Program Direction	5,500	5,550	24,106
Subtotal, Environmental Restoration and Waste Management	1,657,347	2,218,317	2,933,436
Program Slippage Due to Delays in Permitting	0	0	(142,000)
Total, Environmental Restoration and Waste Management	$1,657,347	$2,218,317	$2,791,436

DEPARTMENT OF ENERGY

FY 1991 CONGRESSIONAL BUDGET REQUEST

ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT

OVERVIEW

The Department of Energy faces the largest environmental clean-up problem among the Federal agencies. In March 1989, Secretary Watkins directed the preparation of an Environmental Restoration and Waste Management Five-Year Plan as a means of gaining a better understanding of the specific cleanup and compliance actions required in the near term, as well as the cost of those actions. The Environmental Restoration and Waste Management Five-Year Plan, published August, 1989, is the cornerstone of the Department's long-term strategy in environmental restoration and waste management. The Five-Year Plan reflects DOE's public commitment to conduct its operations in full compliance with environmental laws, regulations and requirements and to move aggressively to cleanup the accumulated problems resulting from 40 years of inadequate attention. The Plan consolidates cleanup activities in the areas of Defense Programs, Nuclear Energy, and Energy Research, treats them as a unified program, and establishes an agenda for compliance and cleanup against which progress will be measured.

The FY 1991 budget request for Environmental Restoration and Waste Management will fund Five-Year Plan activities necessary to prevent near-term adverse health and environmental impacts, promote compliance with existing agreements and implements regulatory standards and permits actions that could reduce risks or costs. The budget request funds priorities 1, 2 and 3 of the Five Year Plan. The Department is proposing a FY 1991 budget level of $2,933 million but recognizes that project slippage due to permitting delays is likely, given the large number of individual projects. Consequently, a slippage adjustment of $142 million has been applied, reducing the budget request for the Five-Year Plan to $2,791 million.

The budget request for Five-Year Plan initiatives are being proposed under a new ,single appropriation account entitled Environmental Restoration and Waste management, consolidating activities previously funded within Defense Programs, Nuclear Energy and Energy Research. In addition, an Office of Environmental Restoration and Waste Management has been established which will administer the Five-year Plan. These consolidations will provide centralized management and planning for more focused budget control and validation of costs, schedules and priorities of projects contained in the Five-Year Plan.

The Plan encompasses four categories of program activities: corrective activities, environmental restoration, waste management operations, and applied R&D.

- Corrective Activities are activities necessary to bring facilities into compliance with applicable local, State and Federal regulations. Almost 200 Corrective Activities have been identified as requiring significant resources over the next five year. Solid waste activities account for more than half of the identified projects and involve bringing facilities into compliance with Resource Conservation and Recovery Act hazardous and mixed waste requirements. Among the solid waste projects being supported in FY 1991 are installation of additional monitoring wells at Richland; completion of construction of the hazardous chemical storage facility at Idaho; and completion of the upgrading underground storage tanks at the Nevada test site.

- Waste Management is concerned with the treatment, storage, and disposal of radioactive, hazardous, mixed, or sanitary wastes generated as a result of ongoing operations at active facilities. Treatment facilities such as shredders, grout plants, incinerators and vitrification plants are planned at Oak Ridge, Idaho, Savannah River, Richland and West Valley. Storage facilities and upgrades are planned at several sites and disposal facility upgrades and some new facilities are planned at Richland, Savannah River, Los Alamos National Laboratory and Oak Ridge.

- Environmental Restoration includes the assessment and clean-up of surplus facilities and inactive sites. The objectives of the Environmental

Restoration Program are to stabilize radioactive waste or perform decontamination and decommissioning at contaminated DOE and legislatively authorized non-government facilities and sites; to conduct assessments and characterization of DOE sites to determine if there is the potential for radioactive and hazardous waste releases; and to protect human health and the environment and return the facilities and sites to productive use, where appropriate. Included in the programs are:

- Facilities and Sites activity which includes characterization, cleanup and closure activities at 17 major DOE installations and authorized non-government sites. Decontamination and decommissioning activities are to be conducted at over 500 facilities.

- Formerly Utilized Sites Remedial Action Project which currently includes 31 sites, 26 former Manhattan Engineering District/Atomic Energy Commission (MED/AEC) sites and 5 sites added by Congress.

- Uranium Mill Tailings Remedial Action Project (UMTRAP) for 24 inactive uranium mill tailings sites and several thousand associated vicinity properties.

- Uranium Mill Tailings Groundwater Restoration Project which will restore, as necessary, the aquifers of 24 designated uranium mill tailings sites.

- Technology Development is an applied R&D initiative to support environmental restoration and waste management activities. The objective of the program is to resolve major technical issues and rapidly advance newer technologies. Application of innovative technologies resulting from a successful Technology Development Program has the potential to produce significant cost savings. Substitution of in-situ vitrification for excavation, treatment and disposal of buried wastes and minimization of transuranic and low-level waste are examples of developments which might produce substantial savings.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

LEAD TABLE

ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT

Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Corrective Activities						
Operating Expenses	$ 24,148	$ 29,368	$ 29,368	$ 44,719	$ +15,351	+52
Capital Equipment	400	2,759	2,759	1,980	-779	-28
Construction	60,506	92,627	92,627	121,899	+29,272	+32
Subtotal	$ 85,054	$ 124,754	$ 124,754	$ 168,598	$ +43,844	+35
Waste Management						
Operating Expenses	$ 841,591	$1,020,091	$1,020,091	$1,265,717	+245,626	+24
Capital Equipment	51,012	45,093	45,093	82,805	+37,712	+84
Construction	202,676	182,519	182,519	303,790	+121,271	+66
Subtotal	$1,095,279	$1,247,703	$1,247,703	$1,652,312	$+404,609	+32
Environmental Restoration						
Operating Expenses	$ 414,404	$ 650,539	$ 650,539	$ 875,020	$+224,481	+35
Capital Equipment	3,100	1,497	1,497	-0-	-1,497	-100
Construction	2,178	4,793	4,793	7,400	+2,607	+54
Subtotal	$ 419,682	$ 656,829	$ 656,829	$ 882,420	$+225,591	+34

	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Technology Development						
Operating Expenses	$ 51,005	$ 180,134	$ 180,134	$ 183,980	$ + 3,846	+2
Capital Equipment	827	3,347	3,347	16,820	+13,473	+402
Construction	0	0	0	5,200	+5,200	
Subtotal	$ 51,832	$ 183,481	$ 183,481	$ 206,000	$ +22,519	+12
Program Direction						
Operating Expenses	$ 5,500	$ 5,550	$ 5,550	$ 24,106	$ +18,556	+334
Totals						
Operating Expenses	$1,336,648	$1,885,682	$1,885,682	$2,393,542	$+507,860	+27
Capital Equipment	55,339	52,696	52,696	101,605	+48,909	+93
Construction	265,360	279,939	279,939	438,289	+158,350	+57
Grand Total	$1,657,347	$2,218,317	$2,218,317	$2,933,436	$+715,119	+32
Less: Adjustment for Permit Slippages	0	0	0	-142,000	-142,000	0
Adjusted Grand Total	$1,657,347	$2,218,317*	$2,218,317*	$2,791,436	$+573,119	+26
Staffing (FTE's)	68	181	181	201		
Headquarters	60	96	96	116		
Operating Offices	8	85	85	85		

*/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and P.L. 101-164 reduction to fund anti-drug activities.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

SUMMARY OF CHANGES
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT

FY 1990 Appropriation	$ 2,218,317
Adjustments	$ 0
FY 1991 Base	$ 2,218,317
Corrective Activities	
- Increase provides for environmental monitoring and analytical laboratory upgrades to meet RCRA requirements and milestones established by Tri-Party agreements and to achieve compliance with applicable local, state and Federal regulations.	$ +43,844
Waste Operations	
- Increase permits initiation of construction of the Hanford Waste Vitrification Plant at Richland, upgrade of the High Level Waste Tank Farm at Idaho and initiation of the design of the Waste Receiving and Processing Facility at Richland.	+62,536
- Assume operation of Purex in support of waste management activities.	+34,000
- Increase in base program operations connected with this treatment, storage, and disposal of all radioactive, hazardous, mixed or sanitary waste.	+308,073
Environmental Restoration	
- Facilities and Sites - Increase continues required field characterization/ analysis at various DOE sites, performs remedial action clean-up and decontamination and decommissioning at highest priority sites and issues Record of Decision for Weldon Spring Site Remedial Action Project.	+172,153

- Formerly Used Sites Remedial Action Project - Increase continues remedial action and engineering activities at highest priority sites.	+21,557
- Uranium Mill Tailings Remedial Action Project - Increase initiates remedial action at 3 sites, continues action at 6 sites, provides surveillance and maintenance at 9 sites and initiates remedial action on 489 vicinity properties.	+30,881
- Uranium Mill Tailings Groundwater Restoration Project - Initiates restoration project at 24 site aquifers and characterize requirements at several additional sites.	+ 1,000
Technology Development	
- Increase funds educational initiatives to include university partnerships, scholarships and fellowships related to environmental management studies and initiation of analytical management activities.	+ 9,046
- Increase capital equipment needed to support initiatives, initiate design for the Environmental and Molecular Science Laboratory, Richland, Washington.	+13,473
Program Direction	
- Increase provides funds the Headquarters staff responsible for the Five-Year Plan. In addition, request also funds DOE Operations Office staff costs associated with environmental management activities.	+18,556
FY 1991 Budget Request	$ 2,933,436
Less Adjustment for Permit Slippages	-142,000
FY 1991 Congressional Budget Request	$ 2,791,436

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

LEAD TABLE

Corrective Activities

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Operating Expenses	$ 24,148	$ 29,368	$ 29,368	$ 44,719	$ 15,351	+52%
Capital Equipment	400	2,759	2,759	1,980	(779)	-28%
Construction	60,506	92,627	92,627	121,899	29,272	+32%
Total, Corrective Activities	$ 85,054	$ 124,754	$ 124,754	$ 168,598	$ 43,844	+35%

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

SUMMARY OF CHANGES

FY 1990 Appropriation	$ 124,754
Adjustments	0
FY 1991 Base	$ 124,754
Environmental Restoration and Waste Management	+19,668
· Increase provides for environmental monitoring and analytical laboratory upgrades required to meet RCRA regulations, and milestones established by the Tri-Party Agreement between DOE, U.S. Environmental Protection Agency, and the State of Washington	
Defense Programs	+14,133
· Increase provides for achieving compliance with regulatory requirements for Defense Programs activities	
Nuclear Energy	+3,117
· Increase necessary to bring non-compliant deficiencies into compliance	
Energy Research	+6,926
· Increase required to achieve compliance with applicable local, State, and Federal regulations	
FY 1991 Congressional Request	$ 168,598

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Corrective Activities (Operating Expenses)

This program performs activities required to bring active and standby facilities at all DOE sites into compliance with all applicable air, water, and solid waste regulatory requirements, agreements, and DOE orders. The primary regulations governing these activities are the Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act, Safe Drinking Water Act, Toxic Substances Control Act, and State and local ordinances. This program is composed of corrective activities at facilities operated by four major DOE programs: Environmental Restoration and Waste Management, Defense Programs, Energy Research, and Nuclear Energy. Although accounted for in this budget category, the corrective activities described will be managed by one of the four base programs. Once the facility is brought into compliance, funding responsibility for maintaining compliance will reside with the base program responsible for the facility.

II. A. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Environmental Restoration and Waste Management	$ 14,662	$ 13,717	$ 23,346	+70
Defense Programs	8,347	13,672	17,808	+30
Nuclear Energy	452	601	809	+35
Energy Research	687	1,378	2,756	+100
Total, Corrective Activities	$ 24,148	$ 29,368	$ 44,719	+52
II. B. Major Laboratory and Facility Funding				
Argonne National Laboratory	$ 647	$ 741	$ 744	0
Idaho National Engineering Laboratory	2,130	7,210	12,050	+67
Kansas City Plant	1,110	1,696	2,946	+74
Lawrence Livermore National Laboratory	750	1,093	1,316	+20
Los Alamos National Laboratory	1,769	3,041	5,285	+74
Oak Ridge National Laboratory	191	257	317	+23
Rocky Flats Plant	1,425	1,835	1,381	-25
Sandia National Laboratories	45	75	174	+132
Westinghouse Hanford Company	12,860	8,552	15,099	+76

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Environmental Restoration and Waste Management			
· Air (ORGDP)	Extended ORGDP Boiler House to enclose two package boilers to maintain air operating permit compliance.	Continue work on Boiler House extension.	Continues work on Boiler House extension. Completes installation of one boiler and initiates operation.
· Water (ORGDP)	Upgraded water flow monitoring system at ORGDP; reduced and controlled residual chlorine conditions.	Continue prior year water quality improvement activities.	Continues same activities as in prior years.
· Solid Waste			
Idaho	Completed interim status documentation and RCRA Part A applications. Began RCRA Part B permit applications.	Continue preparation of RCRA Part B permits.	Continues preparation of RCRA Part B permits. Conducts RCRA trial burns at WERF and PREPP.
	Began characterization of soil contamination at Idaho Chemical Processing Plant (ICPP) tank farm.	Continue soil contamination characterization at ICPP.	Continues same activities as in prior years.
	Completed groundwater monitoring wells installation at Radioactive Waste Management Complex (RWMC), TRU storage area and ICPP.	Begin groundwater monitoring operations at RWMC and ICPP. Increase environmental monitoring required by RCRA.	Continues groundwater monitoring at RWMC and ICPP. Increases environmental monitoring required by RCRA.
	Began RCRA compliance review of waste storage systems at ICPP.	Continue RCRA compliance review.	Continues RCRA compliance review.
	Assessed RCRA "Land-Ban" provisions with regard to wastes to be disposed of at the Waste Isolation Pilot Plant (WIPP).	Continue RCRA "Land-Ban" assessment for WIPP wastes.	Continues same activities as in prior years.
	Developed RCRA compliance training program.	Continue RCRA training program.	Continues RCRA training program.
	No activity.	Begin upgrades required at ICPP waste storage systems including upgrades to piping containment systems. Begin development program to bring Underground Storage Tanks (UST) into RCRA compliance, including secondary containment and leak detection.	Continues upgrades and UST technical support.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
· Richland	Installed RCRA groundwater monitoring wells.	Continue installing RCRA groundwater monitoring wells. Provide technical support to treat contaminated purge water.	Provides 50 RCRA groundwater monitoring wells. Increase is for analytical laboratory upgrades to meet RCRA protocol.
	Initiated planning, assessment, management and coordination of corrective actions for ongoing operations.	Continue prior year activities.	Continues same activities as in prior years to achieve compliance requirements.
	Began RCRA permitting of facilities that separately store dangerous and mixed waste.	Continue prior year activities.	Continues same activities as in prior years.
	Began conceptual design for environmental compliance driven projects.	Continue prior year activities.	Continues same activities as in prior years.
	Began Richland environmental management and hazardous waste program assessments.	Continue prior year activities. Begin interface with regulatory agencies.	Continues same activities as in prior years including meeting with regulatory agencies. Increase provides support to meet Tri-Party Agreement milestones.
Subtotal, Environmental Restoration and Waste Management	$ 14,662	$ 13,717	$ 23,346
Defense Programs			
· Air	Began implementation of site wide audit and monitoring system at Rocky Flats Plant to detect leaks from waste management locations and processes and to assess other releases of pollutants into the environment.	Same activities as in prior year.	Continues same activities as in prior years.
· Water	At Kansas City Plant, began cleaning and relining storm sewers to eliminate PCB releases to nearby streams and expended industrial waste water pretreatment facilities to neutralize corrosive waste water and remove toxic organic compounds.	Continue activities at Kansas City Plant as in previous year.	Continues same activities as in prior years.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
· Water (Cont'd)	Installed sewage system satellite monitoring stations at Lawrence Livermore National Laboratory and began work on sewer effluent monitoring system at Sandia National Laboratory, Albuquerque.	Same activities as in prior year. Increase is for spill prevention, control, and countermeasures program at Los Alamos National Laboratory. Also initiates LANL NPDES projects and septic tank repair.	Continues same activities as in prior years.
· Solid Waste	Performed environmental compliance activities such as RCRA closures, NPDES upgrades, and underground storage tanks testing and repairs at the National laboratories and the weapons production plants such as Rocky Flats and Kansas City.	Same activities as in prior year. Increase supports sewer pipe replacement activities at LLNL, testing, and procurement of storage modules for hazardous waste chemicals at Pantex Plant.	Continues same activities as in prior years. Increase will support ES&H improvements at the national laboratories, replacement of PCB transformers and capacitors at LANL, construction of flood walls around TSCA and RCRA storage areas at the Kansas City Plant, and to complete installation of a potable water system at the Nevada Test Site.
	Performed activities at Richland related to RCRA permits/closure plans for nuclear materials production plants.	Same activities as in prior years. Includes funding for activities at Idaho.	Continues same activities as in prior years.
Subtotal, Defense Programs	$ 8,347	$ 13,672	$ 17,808
Nuclear Energy			
Argonne National Laboratory-West (ANL-West)	Submitted RCRA storage permit for Alcohol Recovery Facility Storage tanks, initiated upgrade of underground storage tanks, replaced flow monitors on all effluent stacks, completed cleanup of historical PCB spill, submitted Radioactive Scrap and Waste Storage Facility (RSWF) Part A application for permit, initiated activities to install new liners in RSWF, submitted permit application for Radioactive Sodium Storage Trailers.	Continue upgrade and replacement of underground storage tanks, initiate upgrade of RSWF, and install new liners in RSWF.	Continues upgrade of RSWF, and continues to install new liners in RSWF.

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III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Richland	Designed and began construction of a double lined trench with leach at collection capability to meet RCRA requirements for disposal of solid radioactive mixed waste (RMW).	Complete construction of solid RMW disposal trench; develop and obtain approval for closure plans for the Large Sodium Fire Facility and the Alkalai Metal Treatment and Storage Facility; initiate action for RCRA permits for the Alkalai Metal Storage Facility and the Maintenance and Storage Facility.	Continues RCRA permitting actions for the Alkalai Metal Storage Facility and the Maintenance and Storage Facility.
Energy Technology Engineering Center (ETEC)	No activity.	No activity.	Provides for correcting RCRA and CERCLA non-compliant deficiencies including cleanup of contaminated grounds at Building 133 Hazardous Waste Facility. Provides for design, procurement, and installation of corrective activity modifications needed to bring liquid effluent from ECTI into compliance.
Subtotal, Nuclear Energy	$ 452	$ 601	$ 809
Energy Research			
Air	Conducted risk assessments for radiological/toxic releases from laboratory facilities at LBL.	Continue risk assessment activities.	Continues risk assessment activities.
Water	Conducted pond characterization at ANL.	No activity.	No activity.
Solid Waste	Removed underground leaking storage tank at Fermi, assessed PCB spills at Fermi, continued replacement of liquid low-level waste lines at ORNL.	Continue FY 1989 activities.	Continues liquid low-level waste lines activity at ORNL.
Subtotal, Energy Research	$ 687	$ 1,378	$ 2,756
Total, Corrective Activities	$24,148	$ 29,368	$ 44,719

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Corrective Activities (Capital Equipment)

The FY 1991 capital equipment request provides critical base programmatic equipment for all Corrective Activities. The requested funding supports equipment upgrades and replacement items that are important to the operations at DOE sites. These equipment needs consist of items with a life span of several years for which rental or lease costs exceed the purchase price and the replacement of existing deteriorated and obsolete items. Equipment funding is distributed by major program area as shown below.

II. A. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Environmental Restoration and Waste Management	$ 400	$ 2,759	$ 1,980	- 28

II.B. Major Laboratory and Facility Funding:

Idaho National Engineering Laboratory	$ 0	$ 0	$ 50	+100
Kansas City Plant	150	1,968	0	-100
Lawrence Livermore National Laboratory	0	30	0	-100
Sandia National Laboratories	0	219	280	+ 28
Westinghouse Hanford Company	250	246	250	+2

III. Activity Description: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Corrective Activities	Provide equipment necessary to achieve compliance with applicable air, water and solid waste regulations.	Provide equipment necessary to achieve compliance with applicable air, water and solid waste regulations.	Provide equipment necessary to achieve compliance with applicable air, water and solid waste regulations.
	$ 400	$ 2,759	$ 1,980

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Corrective Activities (Construction)

Construction project funding is necessary to maintain the health, safety and continuity of waste operations and continue environmental-related projects that correct and clean up environmental hazards. These environmental projects are to bring DOE facilities within compliance of current environmental laws such as the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Clean Water Act, and relevant Environmental Protection Agency and DOE-imposed regulations.

II. A. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Environmental Restoration and Waste Management	$ 34,145	$ 22,303	$ 33,391	+49
Defense Programs	10,626	55,285	65,282	+18
Energy Research	15,535	14,645	20,193	+38
Nuclear Energy	200	394	3,033	+670
Total Corrective Activities	$ 60,506	$ 92,627	$ 121,899	+32

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
Environmental Restoration and Waste Management
(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

IV. A. Construction Project Summary

Corrective Activities

Project Number	Project Title	FY 1989 Appropriation	FY 1990 Appropriation	FY 1991 Request	Unappropriated Balance	TEC
GPP-171	General Plant Projects, VL	$ 11,499	$ 8,220	$ 14,501	$ 0	$ 14,501
91-E-203	SCTI Waste Water Disposal System	0	0	2,861	0	2,861
91-E-304	Sanitary Wastewater Treatment Plant Improvements, ANL	0	0	400	4,030	4,430
91-E-307	Remedial Alternatives 800 Area Sanitary Landfill, ANL	0	0	250	1,700	2,150
90-D-103	ES&H Improvements, VL	0	8,472	4,200	<-----Split Funded----->	
90-D-125	Steam Plant Ash Disposal Facility, Y-12, OR	0	1,478	6,000	5,322	12,800
90-D-126	ES&H Enhancements, AL	0	2,620	0	N/A	N/A
90-R-115	Laboratory and Sanitary Sewer Collection System Rehabilitation, ANL	0	493	1,000	727	2,220
90-R-116	Hazardous Waste Management, BNL	0	158	2,240	2	2,400
90-R-119	Laboratory Wastewater Treatment Plant Improvements, ANL	0	493	3,310	2,837	6,640
89-D-126	ES&H Upgrade, Mound, AL	626	2,700	1,723	<-----Split Funded----->	
89-D-142	Reactor Effluent Cooling Water Thermal Mitigation, SR	15,000	39,400	44,600	28,000	127,000
89-D-172	Hanford Environmental Compliance, RL	7,900	8,176	6,800	<-----Split Funded----->	
88-D-102	Sanitary Wastewater Systems Consolidation, LANL	7,600	3,054	3,500	1,546	16,700
88-R-805	Environmental Improvements, ANL	1,000	250	0	N/A	N/A
88-R-806	Environmental Health and Safety, LBL	635	100	0	<-----Split Funded----->	
88-R-830	Liquid Low-Level Waste Collection and Transfer System Upgrade, OR	11,787	10,353	7,913	147	35,000
87-D-159	ES&H Improvements, Phases I, II, III, IV, and V, FMPC	35	6,660	22,601	<-----Split Funded----->	
86-R-801	Non-radiation Waste Treatment Plant, OR	1,113	0	0	N/A	N/A
87-D-177	Liquid Radiation Waste Cleanup, ID	911	0	0	N/A	N/A
86-D-123	Dry Fly Ash Facility, Y-12, OR	2,400	0	0	N/A	N/A
	Subtotal, Corrective Activities	$ 60,506	$ 92,627	$ 121,899		

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTCRATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 91-GPD-171, General Plant Projects,
Various Locations

PROJECT TEC: $14,501
START DATE: 1st Qtr. FY 1991
COMPLETION DATE: 4th Qtr. FY 1991

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1989	$ 11,499	$ 11,499	$ 10,170
1990	8,220	8,220	6,720
1991	14,501	14,501	14,000

3. Narrative:

These projects provide various items of new construction, additions, alterations, and improvements to the lands, buildings, and utility systems at the Richland, and Idaho offices to support program needs in health, safety, and environment, general support, and other program requirements. Some of the projects may be located on non-Government land.

The FY 1991 funding will be used for design, procurement, and construction activities.

4. Total Project Funding (B/O):

Not applicable.

DEPARTMENT OF ENERGY
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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 91-E-203, SCTI Waste Water Disposal System,
Energy Technology Engineering Center

PROJECT TEC: $ 2,861
START DATE: 1st Qtr. FY 1991
COMPLETION DATE: 1st Qtr. FY 1992

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 2,861	$ 2,861	$ 1,900
1992	0	0	961

3. Narrative:

(a) This project provides for the design, procurement and installation of a disposal system for the cooling tower blowdown and demineralizer regeneration waste water effluents from ETEC's Sodium Components Test Installation (SCTI). The system will be designed for a 25-year life with all equipment suitable for outdoor installation.

(b) The purpose of this project is to provide an environmentally approved disposal system for cooling tower blowdown and demineralizer regeneration waste water effluents from ETEC's SCTI. The disposal system for the aforementioned effluents is required because these effluents have concentrations of certain dissolved solids which exceed the maximum permissible levels allowed by California and federal water quality laws for normal disposal through Rocketdyne's pond system.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 1,900	$ 961
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 91-E-304, Sanitary Wastewater Treatment Plant Improvements, Argonne National Laboratory, Argonne, Illinois

PROJECT TEC: $ 4,430
START DATE: 2nd Qtr. FY 1991
COMPLETION DATE: 2nd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 400	$ 400	$ 350
1992	3,500	3,500	2,800
1993	530	530	1,280

3. Narrative:

This project provides for the pre-treatment, primary treatment, secondary treatment, disinfection, solids handling, flow monitoring, laboratory and analytical control, instrumentation and electrical facilities required for compliance regulations.

The current sanitary sewage treatment plant is not consistently meeting permit requirements. Implementation of this project will ensure compliance with the Great Lakes Upper Mississippi River Board Sanitary Engineering Standards, State of Illinois Water Quality Standards, and Illinois EPA permit criteria.

$400,000 is required in FY 1991 to conduct architectural/engineering activities.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 350	$ 4,030
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 91-E-307, Remedial Alternative for 800 Area Sanitary Landfill, Argonne National Laboratory, Argonne, Illinois

PROJECT TEC: $ 2,150
START DATE: FY 1991
COMPLETION DATE: FY 1994

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 250	$ 250	$ 200
1992	1,400	1,400	600
1993	500	500	1,000
1994	0	0	350

3. Narrative:

This project provides for an effective leachate collection and treatment system. Additional well monitoring sites and a continuous groundwater monitoring surveillance and analysis sampling system will be built.

Under RCRA, CERCLA and SARA, the EPA requires the installation of a groundwater leak-detection system and leachate collection and treatment removal of contaminated landfill effluents.

$250,000 is requested in FY 1991 to allow initiation of architectural/engineering efforts.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 200	$ 1,950
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 90-D-103, ES&H Improvements, Weapons Research and Development Complex, Various Locations

PROJECT TEC: $ 17,700
START DATE: 1st Qtr. FY 1990
COMPLETION DATE: 2nd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 8,472	$ 8,472	$ 6,400
1991	4,200	4,200	5,600
1992	5,028	5,028	3,900
1993	0	0	1,800

3. Narrative:

This project provides for enhancements to the health, safety, and environment of the weapons research and development complex and includes such construction and/or modifications as construction of a sewer diversion facility, upgrade of liquid waste underground retention tanks, replacement of radioactive liquid waste lines, a hazardous waste treatment facility, additional monitoring wells to measure ground water contamination, and sewer improvements. The subprojects are ES&H improvements needed to meet changing Federal and state requirements and to improve existing environmental protection capabilities at the weapons research facilities at the Los Alamos National Laboratory (LANL), the Lawrence Livermore National Laboratory (LLNL), and the Sandia National Laboratory (SNL). No FY 1991 funding is available due to funding constraints.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 6,400	$ 5,600	$ 5,700
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 90-0-125, Steam Plant Ash Disposal Facility,
Y-12 Plant, Oak Ridge, Tennessee

PROJECT TEC: $ 12,800
START DATE: 1st Qtr. FY 1990
COMPLETION DATE: 3rd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 1,478	$ 1,478	$ 1,000
1991	6,000	6,000	2,100
1992	5,322	5,322	9,100
1993	0	0	600

3. Narrative:

This project will provide an environmentally acceptable method for the collection, transportation, treatment, and disposal of coal ash which is generated at the Y-12 steam plant. It will provide facilities for (1) separate collection of dry ash and sluiced bottom ash; (2) dewatering for sluiced bottom ash; and (3) the landfill disposal for both types of ash, including necessary leachate collection and treatment features. The scope of the project will comply with requirements to be set forth by the Tennessee Department of Health and Environment (TDHE) and the Environmental Protection Agency (EPA).

The coal ash sluice-water is presently pumped to a small receiving stream that flows to an abandoned rock quarry. The effluent from the quarry is discharged into a nearby receiving stream, and the quarry potentially influences groundwater movement. This disposal practice is in violation of the Clean Water Act, and the TDHE has determined that the current practice of ash disposal cannot be allowed under the Tennessee Water Quality Control Act; thus, the FY 1991 appropriation is required to initiate construction.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 1,000	$ 2,100	$ 9,700
Capital Equipment	0	0	0	0	0
Operating Expenses	100	0	0	0	0

DEPARTMENT OF ENERGY
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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 90-R-115, Laboratory and Sanitary Sewer Collection System Rehabilitation, Argonne National Laboratory, Argonne, Illinois

PROJECT TEC: $ 2,220
START DATE: 2nd Qtr. FY 1990
COMPLETION DATE: 3rd Qtr. FY 1992

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 493	$ 493	$ 450
1991	1,000	1,000	750
1992	727	727	1,020

3. Narrative:

A program for rehabilitation of all broken and leaking laboratory and sanitary sewers which serve permanent buildings and areas at ANL will be provided. Also, construction of new relief sewers where the capacity is insufficient is proposed.

Many of the sewers have either collapsed due to bearing load capacity being exceeded, infiltration/inflow from leaky joints or direct storm water tie-in connections, or exhibited hydraulic-limiting flow characteristics from root intrusion and are undersized for future conditions.

$1,000,000 is requested in FY 1991. Construction will be initiated.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 450	$ 750	$ 1,020
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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DEPARTMENT OF ENERGY
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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 90-R-116, Hazardous Waste Management Project,
Brookhaven National Laboratory,
Upton, New York

PROJECT TEC: $ 2,400
START DATE: 2nd Qtr. FY 1990
COMPLETION DATE: 4th Qtr. FY 1992

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 158	$ 158	$ 130
1991	2,240	2,240	1,250
1992	2	2	1,020

3. Narrative:

This project is part of a continuing effort to modify existing Hazardous Waste Management facilities and provide additional facility support in the areas of both radioactive and non-radioactive hazardous waste material processing and storage.

Modifications and upgrades which will be accomplished under the scope of this project will eliminate several areas of non-conformance with the Environmental Protection Agency (EPA). New York State Department of Environmental Conservation (NYSDEC), and Suffolk County Department of Health Services (SCDHS) regulations.

$2,240,000 is requested in FY 1991. Construction will be initiated.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 130	$ 1,250	$ 1,020
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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DEPARTMENT OF ENERGY
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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 90-R-119, Laboratory Wastewater Treatment Plant Improvements, Argonne National Laboratory, Argonne, Illinois

PROJECT TEC: $ 6,640
START DATE: FY 1990
COMPLETION DATE: FY 1992

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 493	$ 493	$ 493
1991	3,310	3,310	1,600
1992	2,837	2,837	4,547

3. Narrative:

Rehabilitation of the existing treatment facilities and additional work will be provided including independent physical, biological, chemical and radioactive waste treatment to obtain removals of organic compounds and heavy metals, and radioactivity.

Inadequate facilities exist for treatment of radioactivity, biological and chemical deoxgenating wastes, organic compounds and metals. The emergency overflow pond for peak flow discharges is unlined and continued discharge to it could cause harm to the aquatic environment.

$3,310,000 is requested in FY 1991. Construction will be initiated.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 493	$ 1,600	$ 4,547
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

DEPARTMENT OF ENERGY
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(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 89-D-126, Environmental, Safety, and Health, Phase II, Mound, Miamisburg, Ohio

PROJECT TEC: $ 6,500
START DATE: 1st Qtr. FY 1989
COMPLETION DATE: 4th Qtr. FY 1992

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1989	$ 626	$ 626	$ 575
1990	2,700	2,700	2,009
1991	1,723	1,723	2,091
1992	41	41	415

3. Narrative:

The mission of this project is to ensure that Mound's activities are in compliance with all Federal, state, and local regulations. This project is a second major part of an overall program under DOE Environmental, Safety, and Health guidance to the various sites. This project is a follow-on to Project 87-D-127, Environmental, Safety, and Health Upgrade, Phase I, and includes three subprojects.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 575	$ 2,009	$ 2,091	$ 415
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 89-D-142, Reactor Effluent Cooling Water Thermal Mitigation, Savannah River Site, South Carolina

PROJECT TEC: $127,000
START DATE: 1st Qtr. FY 1989
COMPLETION DATE: 2nd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1989	$ 15,000	$ 15,000	$ 8,900
1990	39,400	39,400	43,100
1991	44,600	44,600	34,400
1992	17,700	17,700	30,700
1993	10,300	10,300	9,900

3. Narrative:

This project will provide a cooling tower system for the K Reactor to achieve compliance with the State of South Carolina's Water Standards and Consent Order 84-4-W, Amendment #2, between DOE and the State of South Carolina Department of Health and Environmental Control (SCDHEC). It will replace the present once-through system in which cooling water is returned to the tributaries of the Savannah River.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 8,900	$ 43,100	$ 34,400	$ 40,600
Capital Equipment	0	0	0	0	0
Operating Expenses	4,280	200	0	0	0

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DEPARTMENT OF ENERGY
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(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 89-D-172, Hanford Environmental Compliance, Richland, Washington

PROJECT TEC: $124,500a/
START DATE: 2nd Qtr. FY 1989
COMPLETION DATE: 4th Qtr. FY 1994

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1989	$ 7,900	$ 7,900	$ 6,300
1990	8,176	8,176	6,500
1991	6,800b/	6,800	5,440
1992	2,540	2,540	4,488
1993	1,800	1,800	3,000
1994	0	0	1,488

3. Narrative:

This line item request represents the capital improvements necessary to achieve compliance with applicable environmental requirements at the Hanford site.

The FY 1991 funding will be used to continue the 9 subprojects begun in FY 1989 and FY 1990, and to initiate three new subprojects listed below:

- o B-Plant Radiological Effluent/Containment Upgrades (TEC $12,000)
- o Environmental Hot Cell Expansion (TEC $13,800)
- o PUREX Liquid Effluent Treatment Facility (TEC $11,200)

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 7,900	$ 8,176	$ 6,800	$ 4,250
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

a/ Total project estimated cost is $180 million. Additional subprojects will be included in the future.
b/ Funding request is for Corrective Activities associated with this project only. A seperate data sheet is being submitted for the Waste Operations portion of this project.

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(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 88-D-102, Sanitary Wastewater Systems Consolidation,
Los Alamos National Laboratory, Los Alamos, New Mexico

PROJECT TEC: $ 16,700
START DATE: 1st Qtr. FY 1989
COMPLETION DATE: 4th Qtr. FY 1992

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1988	$ 1,000	$ 1,000	$ 24
1989	7,600	7,600	7,400
1990	3,054	3,054	3,300
1991	3,500	3,500	3,600
1992	1,546	1,546	2,376

3. Narrative:

This project provides for a new sanitary wastewater treatment plant and collection system to replace existing 30-year-old treatment facilities that do not comply with current environmental protection requirements. The wastewater treatment plant will be located east of Technical Area WA-Site (TA-66) and north of Pajarito Road. The collection system extends site-wide to serve 20 technical areas.

FY 1991 funding will be used for construction of land improvements, collection system, and treatment plant facilities.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 1,000	$ 7,400	$ 3,300	$ 3,600	$ 2,376
Capital Equipment	0	0	0	0	0
Operating Expenses	120	0	0	0	0

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DEPARTMENT OF ENERGY
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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 88-R-830, Liquid Low-Level Waste Collection and Transfer System Upgrade, Oak Ridge National Laboratory, Oak Ridge, Tennessee

PROJECT TEC: $ 35,000
START DATE: 2nd Qtr. FY 1988
COMPLETION DATE: 4th Qtr. FY 1991

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1988	$ 4,800	$ 4,800	$ 572
1989	11,787	11,787	8,100
1990	10,353	10,353	17,600
1991	7,913	7,913	8,581
1992	147	147	147

3. Narrative:

This project will upgrade a portion of the existing Bethel Valley liquid low-level waste collection and transfer system. The project includes approximately one mile of doubly contained stainless steel piping and five stainless steel tanks (to be underground in stainless-steel lined concrete vaults). The pipelines will be equipped with an active leak detection and monitoring system and will be tied in with an overall operational control control system. The project will also include a new (4,000 sq. ft.) control facility for receiving and discharging to the pipeline system liquid low-level waste which will be transported by truck in tanks and small bottles (in lieu of piping). Appropriately equipped new trucks will be provided to transport waste.

The purpose of this project is to upgrade a significant portion of liquid low-level waste collection and transfer system to protect personnel and public safety and health and the environmental and to meet all applicable regulations. The majority of the existing system was constructed in the 1960's using materials and approaches considered applicable at the time. The original pipes are rapidly deteriorating and leaks are expected to occur at an increasing rate.

$7,913,000 is requested for FY 1991 funding to complete this project.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 572	$ 8,100	$ 17,600	$ 8,581	$ 147
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 87-D-159, Environmental, Health, and Safety Improvements, Phases I, II, III, IV, and V, Feed Materials Production Center, Fernald, Ohio

PROJECT TEC: $56,934 a/
START DATE: 2nd Qtr. FY 1987
COMPLETION DATE: 4th Qtr. FY 1994

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1987	$ 0	$ 0	$ 0
1988	0	0	0
1989	35	35	35
1990	6,660	6,660	6,660
1991	22,601	22,601	22,601
1992	16,085	16,085	16,085
1993	11,402	11,402	11,402
1994	151	151	151

3. Narrative:

This project provides a series of improvements that will reduce hazardous discharges from the Feed Materials Production Center (FMPC) and ensure that plant operations do not pose a threat to the environment, the community, or the work force. This multi-phase improvements project will assure the environmentally safe operation of FMPC to produce depleted and slightly enriched uranium metals for the nuclear materials production reactors. Major improvements are planned for air quality control systems, water quality control systems, improvements to contamination control, reduction of radiation exposure to workers and enhancement of alarm and warning systems.

FY 1991 funds will be used for design, procurement, and construction activities.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 35	$ 6,660	$ 22,601	$ 27,638
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

a/ Funding request for Corrective Activities associated with this line item only. Separate data sheets are being submitted reflecting funding profiles for Nuclear Materials Production and Environmental Restoration portions of this project.

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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

LEAD TABLE

Environmental Restoration

Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Facilities and Sites						
Operating Expenses	$284,144	$543,362	$543,362	$713,320	+ 169,958	+ 31
Capital Equipment	300	412	412	0	- 412	-100
Construction	2,178	4,793	4,793	7,400	+ 2,607	+ 54
Subtotal	286,622	548,567	548,567	720,720	+ 172,153	+ 31
Formerly Utilized Sites Remedial Action Project						
Operating Expenses	22,030	14,544	14,544	36,200	+ 21,656	+149
Capital Equipment	200	99	99	0	- 99	-100
Subtotal	22,230	14,643	14,643	36,200	+ 21,557	+147
Uranium Mill Tailings Remedial Action Project						
Operating Expenses	108,230	92,633	92,633	124,500	+ 31,867	+ 34
Capital Equipment	2,600	986	986	0	- 986	-100
Subtotal	110,830	93,619	93,619	124,500	+ 30,881	+ 33
Uranium Mill Tailings Groundwater Restoration Project						
Operating Expenses	0	0	0	1,000	+ 1,000	+100
TOTAL	$419,682	$656,829	$656,829	$882,420	+$225,591	+ 34

LEAD TABLE - Environmental Restoration (cont'd)

Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Operating Expenses.....	$414,404	$650,539	$650,539	$875,020	+$224,481	+ 35
Capital Equipment.....	3,100	1,497	1,497	0	- 1,497	-100
Construction.....	2,178	4,793	4,793	7,400	+ 2,607	+ 54
Total Program.....	$419,682	$656,829	$656,829	$882,420	+$225,591	+ 34

Authorization: Sec. 31, P.L. 83-703
P.L. 95-604, P.L. 100-616 (Uranium Mill Tailings)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

SUMMARY OF CHANGES

Environmental Restoration

FY 1990 Appropriation	$656,829
Adjustments	0
FY 1991 Base	656,829

Program increases and decreases:

Facilities and Sites ..... +172,153

- Continue required field characterization/analysis at various Department sites and increase Remedial Investigations/Feasibility Study (RI/FS)-NEPA activities.
- Perform remedial action cleanup and decontamination and decommissioning efforts at highest priority Department sites.
- Issue Record of Decision for the Weldon Spring Site Remedial Action Project in Missouri and initiate major waste removal action at Quarry.

Formerly Utilized Sites Remedial Action Project ..... +21,557

- Continue remedial action and engineering activities at the highest priority sites.
- Conduct necessary field investigations/analyses and accelerate efforts on development of RI/FS-NEPA documents.
- Initiate asbestos and equipment removal and building demolition at the Colonie, New York site.
- Initiate Phase II remedial actions at the Albany, Oregon site.

SUMMARY OF CHANGES - Environmental Restoration (cont'd)

Uranium Mill Tailings Remedial Action Project ..... +30,881

- Initiate remedial action at 1 site (Gunnison, Colorado) and complete remedial action at 1 site (Durango, Colorado).
- Continue remedial action at 2 sites (Falls City, Texas and Grand Junction, Colorado) and restart, after suspending, remedial action at 4 sites (Ambrosia Lake, New Mexico; Mexican Hat, Utah; Monument Valley, Arizona; and Rifle, Colorado).
- Continue surveillance and maintenance (S&M) at 6 completed sites (Canonsburg, Pennsylvania; Green River, Utah; Lakeview, Oregon; Salt Lake City, Utah; Shiprock, New Mexico; and Spook, Wyoming), and initiate S&M at 3 sites (Durango, Colorado; Riverton, Wyoming; and Tuba City, Arizona).
- Initiate remedial action on 489 vicinity properties; and continue preparation of engineering and environmental analysis reports for other sites.

Uranium Mill Tailings Groundwater Restoration Project ..... +1,000

- Initiate a groundwater restoration project to restore, as necessary, the aquifers of 24 designated uranium mill tailings sites to ensure compliance with applicable standards.
- Initiate groundwater characterization and design development efforts at several sites.

FY 1991 Congressional Budget Request $882,420

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DEPARTMENT OF ENERGY
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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

Environmental Restoration

I. Preface: Facilities and Sites

The Facilities and Sites activity conducts remedial actions and decontamination and decommissioning (D&D) projects to reduce and remove the potential risks to the environment and to human health and safety resulting from past Department activities. The program objective is to protect human health and the environment and return the facilities and sites to productive use, where appropriate. The program includes several sites on the Environmental Protection Agency (EPA) National Priorities List (NPL). The program also includes two Major Systems Acquisitions (MSA) and two Major Projects. Other projects include activities related to ore handling and processing, reactor, laboratory, and fuel fabrication facilities and sites. This activity consolidates all remedial action and D&D activities previously budgeted under the Office of Defense Programs; the Office of Nuclear Energy, Energy Supply Research and Development activities; and the Office of Energy Research. The Office of Nuclear Energy Uranium Enrichment activities are budgeted separately and are included under the Uranium Enrichment appropriation activity. For additional details on schedules and activities for several of the larger projects under this activity, please refer to the one page Operating Expense Funded Data Sheet Project Summaries, the detailed Operating Expense Funded Data Sheets, and the one page Construction Project Data Sheet Summaries and detailed data sheets included with this submission.

The remedial action requirements are derived primarily from the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the Resource Conservation and Recovery Act (RCRA) of 1976, as amended. The program consists primarily of activities related to corrective actions upon closure of waste treatment, storage, and disposal facilities, and remediation of inactive waste disposal sites, uncontrolled release sites and underground storage tanks. The scopes, schedules and cleanup standards for these activities are negotiated with the Environmental Protection Agency (EPA) and the States and are the subject of RCRA permits, Consent Orders and Compliance Agreements, and CERCLA Federal Facility Agreements. Highest priority is given to actions that (1) must be undertaken immediately to minimize or prevent significant risk to workers, the public, or environment, (2) are not included in item (1), but are required by current (in place or in negotiation) local, State, and Federal regulatory agreements, and (3) ongoing activities.

Significant increases in funding for this program are required in FY 1991 as program activities continue to shift into the detailed investigation, characterization, and cleanup phases of remediation. As in the past, capital equipment and construction activities are included in operating expenses to provide maximum flexibility in addressing Environmental Restoration tasks.

The activities in this budget submission are included in the Environmental Restoration and Waste Management Five-Year Plan developed by DOE. They fall under the Environmental Restoration section of the Plan. The FY 1991 budget request and outyear funding profile is consistent with the Five-Year Plan. Of the four priority categories contained in the Five-Year Plan, the FY 1991 budget request includes projects which have been categorized as either Priority #1, #2, or #3.

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II. A. Summary Tables:

Program Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request	% Change
CERCLA				
a. Assessment	$ 29,606	$ 41,724	$ 65,393	+57
b. Cleanup	15,757	36,207	108,592	+200
Subtotal, CERCLA	45,363	77,931	173,985	+123
RCRA				
a. Assessment	20,696	46,287	69,797	+51
b. Cleanup	64,861	149,317	94,590	-37
Subtotal, RCRA	85,557	195,604	164,387	-16
RCRA/CERCLA				
a. Assessment	63,866	190,657	204,021	+7
b. Cleanup	11,530	20,915	59,847	+186
Subtotal, RCRA/CERCLA	75,396	211,572	263,868	+25
Decontamination & Decommissioning (D&D)				
a. Assessment	24,959	27,304	59,856	+119
b. Cleanup	55,347	36,156	58,624	+62
Subtotal, D&D	80,306	63,460	118,480	+87
Total, Facilities and Sites	$286,622	$548,567	$720,720	+31

III. Activity Description:

Program Activity	FY 1989	FY 1990	FY 1991
Facilities and Sites			
CERCLA Assessment	Performed activities to confirm presence or absence of hazardous, radioactive, or mixed waste materials at inactive and surplus sites, characterized releases, determined the extent of the problems, prepared NEPA and CERCLA documentation, and selected preferred remedial action alternatives. Some examples are:	Continue activities as described in prior year; increase related to growing number of sites being investigated as activities are consolidated under the Five-Year Plan. Some examples are:	Continue activities as described in prior years; increase related to additional sites being investigated. Some examples are:
	Performed RI/FS activities on polychlorinated biphenyl contaminated soil at Kansas City Plant.	Complete RI/FS activities at D/26 area of Kansas City Plant.	Begin studies to determine extent of soil contamination under plating facility at Kansas City Plant.
	Performed RI/FS activities at Sandia National Lab (SNL), Albuquerque; conducted site characterization.	Initiate RI/FS at Pagano Salvage Site.	Initiate RI/FS at Tonopah Test Range; conduct RI/FS at Pagano Salvage Site.
	Participated in site characterization activities with Air Force and other parties at South Valley Superfund site.	Continue activities as described in prior year.	Initiate RI/FS at the South Valley Superfund site.
	Performed RI/FS of Lawrence Livermore National Laboratory (LLNL) main site groundwater contamination as required by CERCLA/SARA and Federal Facility Agreement (FFA).	Continue RI/FS of LLNL main site groundwater contamination as required by FFA, submitting drafts of the RI/FS reports.	Complete RI/FS of LLNL main site groundwater contamination as required by FFA and issue Record of Decision (ROD).
	Conducted RI/FS on Rocky Flats Plant Site.	Complete on-site RI/FS; continue off-site investigations.	Accelerate schedule for soil and water characterization at Rocky Flats Plant.

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III. Facilities and Sites (continued):

Program Activity	FY 1989	FY 1990	FY 1991
CERCLA Assessment (cont'd)	Began planning and development of Federal Facility Agreement (FFA) for CERCLA cleanup at the Savannah River Site.	Continue program management and planning support for CERCLA activities; begin planning and scheduling activities under FFA; develop community relations plan; begin site-specific RI/FS activities.	Continue to support CERCLA activities and the schedule of the FFA; CERCLA activities will be driven by the FFA and will be scheduled annually.
	Initiated RI/FS activities for operable units 4 and 6 at the Feed Materials Production Center (FMPC).	Complete installation and sampling of additional offsite wells; complete K-65 sampling project; complete RI reports for operable unit 4 at the FMPC.	Complete RI reports for operable units 1, 2, 3 and 5; complete FS reports for operable units 1-5; complete draft ROD for operable unit 4 at the FMPC.
	Issued Chemical Plant Remedial Investigation/ Feasibility Study (RI/FS) Environmental Impact Statement (EIS) Work Plan to the public for the Weldon Spring Site Remedial Action Project; completed draft RI, Risk Evaluation and Environmental Assessment (EA) for Quarry bulk waste removal.	Issue draft FS-EIS to public for the Weldon Spring Site Remedial Action Project; issue ROD for Quarry bulk waste removal; issue RI/FS to the public.	Issue ROD for the Weldon Spring Site Remedial Action Project.
	Completed draft RI/FS for the Monticello Mill Site; continue field characterization work.	Continue Monticello Mill Site planning activities; continue final RI/FS activities; conduct public hearings; issue Record of Decision; purchase land, as required, for final tailings disposal cell.	Finalize design of Monticello Mill Site remedial action; issue bid packages and award contract for the millsite remedial action; purchase additional land, if required, for final tailings disposal cell.

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III. Facilities and Sites (continued):

Program Activity	FY 1989	FY 1990	FY 1991
CERCLA Assessment (cont'd)	Conducted characterization and assessment of landfills and ponds at Argonne National Laboratory (ANL) and environmental assessment at Lawrence Berkeley Laboratory (LBL).	Continue characterization and assessment of Sawmill Creek at ANL, and the 800 area landfill characterization.	Conduct assessments at ANL and LBL.
Subtotal, CERCLA Assessment	($29,606)	($41,724)	($65,393)
CERCLA Cleanup	Prepared detailed designs and engineering plans, implemented selected remedial actions, verified completion of remedial actions and completed documentation at inactive and surplus sites. Examples of some activities are listed below:	Continue activities as described in prior year; increase due to growth in number of remedial actions being undertaken as activities are consolidated under the Five-Year Plan. Examples of some activities are listed below:	Continue activities as described in prior years. Continued growth in the number of sites requiring remedial actions. Funding for subprojects formerly included in Environmental, Health and Safety Improvements, Phases I through V, FMPC, are included in this category as operating expenses. Examples of some activities are listed below:
	Performed pilot groundwater and soil remediation at Lawrence Livermore National Laboratory (LLNL) in accord with Federal Facility Agreement (FFA).	Continue prior year activities; increase is for treatment system site preparation and power upgrades.	Continue prior year activities at LLNL as required by State and EPA regulatory orders.

III. Facilities and Sites (continued):

Program Activity	FY 1989	FY 1990	FY 1991
CERCLA Cleanup (cont'd)	Completed demolition of Buildings 401 and 409 at the Weldon Spring Site Remedial Action Project, MO; completed containerized chemical removal, ash pond isolation dike and overhead piping removal; relocated and erected Administration and Laboratory facility; awarded subcontract to design and constructed the Quarry waste water treatment plant.	Complete installation of the Quarry support facilities and Quarry waste water treatment plant; complete construction of the Chemical Plant Material Staging Area and begin operation.	Initiate Quarry dewatering; award site waste water treatment plant design and construction subcontract; complete installation and startup operation of the site waste water treatment plant; complete construction of the quarry haul road and the temporary storage area and begin operation; initiate excavation of contaminated material from quarry; complete demolition of 6 Chemical Plant buildings and begin removal of the site railroad and 5 additional buildings; complete remedial actions of the Army and Busch vicinity properties; complete design of the Disposal Facility.
	Executed CERCLA 120 FFA with EPA and the State of Utah for the Monticello Remedial Action Project and Monticello Vicinity Properties, UT; performed inclusion screening surveys on 49 additional properties and designated 16 new properties for a total of 91; completed remedial action on 13 additional vicinity properties, i.e., 65 of 91 currently designated.	Complete remedial action at 21 vicinity properties, i.e., 86 of 112 currently designated; issue Record of Decision; complete inclusion surveys for additional properties contaminated by windblown tailings.	Complete remedial action at all 5 remaining designated vicinity properties, and as many additional properties as funding allows.
	Prepared chemical scoping study for the Niagara Falls Storage Site (NFSS) Remedial Action, NY; initiated bench-scale tests of in-situ vitrification and K-65 containment studies; continued cleanup of residual contamination; prepared draft of "On-site Post Remedial Action Report"; continued required surveillance and maintenance.	Seal abandoned monitoring wells; perform chemical characterization, if necessary; publish in-situ vitrification report; complete K-65 containment studies and publish report; continue required surveillance and maintenance.	Complete on-site waste cleanup; remove asbestos and prepare for demolition of Building 401, continue surveillance and maintenance.

III. Facilities and Sites (continued):

Program Activity	FY 1989	FY 1990	FY 1991
CERCLA Cleanup (cont'd)	No activity.	No activity.	Initiate Remedial Design/Remedial Assessment (RD/RA) at South Valley Superfund site.
	No activity.	Begin corrective actions for small CERCLA sites at the Savannah River Site that may require immediate attention under FFA.	Continue corrective actions for waste sites in the FFA.
	No activity.	Submit engineering evaluation/cost assessment (EE/CA) to EPA for the South Plume, K-65 silos and waste pit area runoff removal actions at the Feed Materials Production Center (FMPC); initiate conceptual design reports (CDR) for operable units 1 and 4.	Complete CDR for operable units 1, 2, and 4; initiate CDR for operable units 3 and 5; complete design criteria report for unit 4; initiate CDR for engineered treatment, package and storage facility at the FMPC.
	Conducted Poly Chlorinated Biphenal (PCB) and chromate cleanup at FERMI and lime sludge removal at ANL.	No activity.	Conduct sewer pipe restoration at LBL and cleanup Sawmill Creek at ANL.
	No activity.	No activity.	Initiate remediation of 000 area landfill, 570 holding pond, ENE area and lime Sludge removal at ANL.
Subtotal, Cleanup	($15,757)	($36,207)	($108,592)
Total, CERCLA	($45,363)	($77,931)	($173,985)

III. Facilities and Sites (continued):

Program Activity	FY 1989	FY 1990	FY 1991
RCRA Assessment	Performed activities to confirm, characterize, determine the extent of, assess, and select preferred alternatives to remediate hazardous, radioactive and mixed waste sites under the provisions of RCRA Section 3004(u), 40 CFR 264, RCRA 3004(v), and RCRA 3008(h). Examples of RCRA Assessment efforts are listed below:	Continue activities as described in prior year. Examples of RCRA Assessment efforts are listed below:	Continue activities as described in prior years. Examples of RCRA Assessment efforts are listed below:
	Performed RCRA Facility Investigations (RFI) activities at Kansas City Plant.	Complete all RFI activities.	Continue ongoing efforts at the Kansas City Plant and initiate new RCRA assessment activities at several waste sites contaminated with PCBs, volatile organic compounds, and waste oil.
	Richland initiated engineering/design for the 300 Area Process Trenches effluent treatment system; completed Single Shell Tank (SST) waste characterizations, retrieval investigations, and barrier development.	Continue prior year activities; increase initiates construction of 300 Area Process Trenches effluent treatment system.	Continue prior year activities; increases support for Environmental Impact Statement and closure of SST operable units.
	Performed assessments at Pantex Plant Chemical Burn Pits, Rocky Flats 881 Hillside, and Rocky Flats sanitary landfill.	Complete characterization of Pantex Plant Site and select remedial alternative; prepare design for Rocky Flats landfill closure; initiate 881 Hillside remedial actions.	Initiate remedial action on Pantex Plant Chemical Burn Pit; complete Titles I and II design, groundwater and soil characterization for landfill closure.
	Conducted site characterization at Sandia National Laboratory, Albuquerque (SNLA).	Continue activities at Ta-3 and Ta-5, Coyote Canyon Blast Area, and other areas.	Initiate SNLA RCRA Facility Investigation/Corrective Measures Study (RFI/CMS) and NEPA documents preparation at high priority spills, release and disposal sites.
	No activity.	No activity.	Complete RFI/CMS at Northeast and other miscellaneous areas at the Pinellas site.

III. Facilities and Sites (continued):

Program Activity	FY 1989	FY 1990	FY 1991
RCRA Assessment (cont'd)	The Savannah River Site developed RCRA Section 3004(u) Facility Investigation program plans for 71 waste units.	Prepare 20 site-specific RFI work plans for the Savannah River Site RCRA 3004(u) waste units; develop data base system to support regulatory compliance and quality assurance (QA) programs for existing generated data.	Prepare 35 site-specific RFI work plans for RCRA 3004(u) waste units; develop new Savannah River Laboratory support programs for waste site closures and post closures.
Subtotal, RCRA Assessment	($20,696)	($46,287)	($69,797)
RCRA Cleanup	Prepared detailed designs and engineering plans; implemented selected alternatives; performed verification of completion of hazardous, radioactive, and mixed waste sites according to the provisions of RCRA. Examples of RCRA cleanup efforts are listed below:	Continue activities as described in prior year. Examples of RCRA cleanup efforts are listed below:	Continue activities as described in prior years. Examples of RCRA cleanup efforts are listed below:
	At Richland, initiated closure plans for B Pond, the A-29 Ditch, and non-radioactive Dangerous Waste landfill; supported planning and cleanup of the 183-H Solar Basins.	Continue work on closure plan for Richland's non-radioactive Dangerous Waste landfill and B Pond; initiate interim stabilization efforts on B Pond and A-29 Ditch; continue cleanup/closure of the 183-H Solar Basins.	Complete closure plan for the non-radioactive Dangerous Waste landfill; complete interim stabilization efforts on B Pond and A-29 Ditch; continue cleanup/closure of the 183-H Solar Basin.
	Constructed RCRA caps on Solid Waste Management Units (SWMU) at the Y-12 Plant, performed closure activities on Treatment, Storage and Disposal (TSD) Units for oil/solvent drum storage area.	Complete RCRA caps; perform TSD closure at the Y-12 garage underground tanks.	Complete RCRA work associated with CAPCA, Phase I; complete TSD closure at Biodentrification Facility Bioreactors.
	Submitted closure plans to EPA for Barium Chloride Facility and trane liquid incinerator at the FMPC.	Complete closure of incinerator and Barium Chloride Facility; removal of 9 out of 13 underground storage tanks; submit closure plans for plant 1 pad, plant 6 pad, and tanks T5 and T6 at the FMPC.	Removal of 3 underground storage tanks; initiate closure of plant 1 pad, plant 6 pad, and tanks T5 and T6.

III. Facilities and Sites (continued):

Program Activity	FY 1989	FY 1990	FY 1991
RCRA Cleanup (cont'd)	Removed and treated PCB contaminated soils at Kansas City Plant.	Continue removal or treatment of PCB-contaminated soils at D/26 site.	Continue RCRA CA at the Kansas City Tank Farm; initiate groundwater cleanup at the Northeast Area and South Lagoon; complete PCB removal from the abandoned Indian Creek Outfall.
	No activity.	At Los Alamos, initiate closure on TA-16, Area P landfills, and RA at TA-54 areas and TA-40 explosives detonation sites.	Continue limited design and RCRA permitting of Hazardous and Mixed Waste disposal facility; complete TA-54, Area P.
	At Lawrence Livermore National Laboratory (LLNL), Site 300, closed decommissioned high explosive (HE) rinse-water lagoons by capping with clay; sealed and abandoned 6 inactive water-supply wells.	Conduct Remedial Action (RA) at Pit 7 Complex and 8834 Complex; close landfill Pits 1 and 7; begin closure of HE Burn Pits, conduct RA at GSA/Offsite and landfill Pit 6.	Conduct RA at LLNL Site 300 Pit 7 Complex, 8834 Complex, GSA/Offsite, landfill Pit 6, EFA/8850, HE Process Area; close HE Burn Pits.
	Completed Savannah River Site closure activities for H-Area Settling Basin; continued A/H-Area Groundwater remediation through 2017; began closure of Mixed Waste Management Facility and F&H-Areas Seepage Basins; developed closure plans for Natural Resources Defense Council (NRDC) consent decree waste sites (Met Lab Basin, 4 Acid/Caustic Basin, New TNX Basin, and SRL Seepage Basins).	Continue A/H-Area groundwater remediation; continue closure activities for Mixed Waste Management Facility and F&H-Areas Seepage Basins; continue development of closure plans for NRDC Waste sites.	Continue A/H-Area groundwater remediation through the year 2017; complete closures for Mixed Waste Management Facility and F&H-Area Seepage Basins; conduct closure activities on NRDC waste sites.
	Completed closure of abandoned tanks at Lawrence Berkeley Laboratory (LBL).	Start remediation of hot ponds at the Inhalation Toxicology Research Institute (ITRI).	Continue remediation of hot ponds at ITRI.
Subtotal, RCRA Cleanup	($64,861)	($149,317)	($94,590)
Total, RCRA	($85,557)	($195,604)	($164,387)

III. Facilities and Sites (continued):

Program Activity	FY 1989	FY 1990	FY 1991
RCRA/CERCLA Assessment	Performed activities to confirm, characterize, determine the extent of, assess, and select preferred alternatives to remediate hazardous, radioactive and mixed waste sites where the governing regulation (RCRA/CERCLA) has not been determined or may change. Examples are listed below:	Continue activities as described in prior year. Examples are listed below:	Continue activities as described in prior years. Examples are listed below:
	Characterized Idaho National Engineering Laboratory (INEL) buried waste and assessed remedial alternatives; completed geophysical survey of buried waste pits and trenches and initial penetration of Pad A; performed RCRA Facility Investigation (RFI) for Test Area North (TAN) groundwater contamination; installed pilot scale treatment system.	Continue characterization of buried waste and assessment of remedial technologies; install six deep monitoring wells at the Radioactive Waste Management Complex (RWMC) to sample the aquifer; continue RFI for TAN groundwater contamination and operation of pilot groundwater treatment system; initiate remedial investigation of Test Reactor Area (TRA) warm waste ponds on the vadose zone beneath the ponds.	Continue characterization of the buried waste and assessment of remedial technologies; continue groundwater monitoring; close five previously drilled vadose zone boreholes to prevent migration of contaminants; complete RFI and corrective measures study (CMS) of TAN groundwater contamination; continue Test Reactor Area (TRA) warm waste pond remedial investigations; initiate feasibility study.
	Performed program management and planning support for the Hanford ER program; initiated RI/FS and RFI/CMS work plans in operable units (OU) in each of the 100, 200, 300/600, and 1100 Areas; work plans being developed for a total of seven OUs; continued contaminated soil site barrier investigation; upgraded laboratories to support analyses of RI/FS samples.	Continue prior year activities; increases are for studies of seven additional OUs, increasing analytical laboratory capability for waste analysis to support RI/FS.	Continue prior year activities; increase will initiate studies of six additional OUs, increase analytical laboratory and drilling capability to support restoration efforts.

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III. Facilities and Sites (continued):

Program Activity	FY 1989	FY 1990	FY 1991
RCRA/CERCLA Assessment (cont'd)	Conducted Remedial Investigation/Facility Survey (RI/FS) on Rocky Flats sites.	Complete on-site RI/FS; continue off-site investigations.	Complete Rocky Flats Plant groundwater and soil characterization for landfill closure, and continue preparation of associated NEPA documentation.
	Conducted RI/FS at Mound on spill, release and disposal sites per negotiations with EPA and State of Ohio.	Conduct RI/FS at Mound.	Complete RI/FS and NEPA activities at Mound Laboratory under FFA.
	Continued routine maintenance and surveillance of inactive waste management sites; continued site investigations; continued Hazardous Waste Remedial Action Project (HAZWRAP) support; continued waste area grouping (WAG) 6 RI/FS; continued on site groundwater assessment in Y-12 Bear Creek Valley at the Oak Ridge Reservation.	Continue routine maintenance and surveillance of inactive waste management sites; continue site investigations; continue HAZWRAP support; continue WAG 6 RI/FS; initiate RI/FS activities off-site (clinch river and east fork poplar creek); initiate RI in WAG 1; continue on-site groundwater assessment in Y-12 Bear Creek Valley; initiate at K-25, assessment for 770 WAG, 1420 WAG, K-1085 Burn Area and K-1401 Acid Line at the Oak Ridge Reservation.	Initiate construction of groundwater monitoring and characterization systems; continue routine surveillance of inactive sites; continue site investigation RI for WAG 1; initiage site investigations for WAGs 4, 5 and 7; continue HAZWRAP support; complete WAG 6 RI/FS; continue RI/FS activities offsite; continue work on RI/FS efforts at Y-12 and K-25 at the Oak Ridge Reservation.
	Began to prepare groundwater assessment plan for the Stanford Linear Accelerator Center (SLAC).	Complete assessment plan for SLAC.	No activity.
	Began to prepare assessment of Scarboro Facility at Oak Ridge Associated Universities (ORAU).	Continue assessment of ORAU.	Complete assessment of ORAU.
	Conducted remedial and site investigations, preliminary assessments and feasibility studies at Oak Ridge National Laboratory (ORNL) and Brookhaven National Laboratory (BNL).	Conduct remedial and site investigations, preliminary assessments and feasibility studies at ORNL and BNL.	Conduct remedial and site investigations, preliminary assessments and feasibility studies at ORNL and BNL.
Subtotal, RCRA/CERCLA Assessments	($63,866)	($190,657)	($204,021)

III. Facilities and Sites (continued):

Program Activity	FY 1989	FY 1990	FY 1991
RCRA/CERCLA Cleanup	Prepared detailed designs and engineering plans, implemented selected remedial actions, verified completion of remedial actions and completed documentation at inactive and surplus facilities. Examples of some cleanup efforts are listed below:	Continue activities as described in prior year; increase due to growth in number of remedial actions being undertaken. Examples of some cleanup efforts are listed below:	Continue activities as described in prior years; increase is due to continued growth in sites requiring remedial actions. Examples of some cleanup efforts are listed below:
	Continued Reactive Metals, Inc. (RMI) investigation at FMPC; implementation of soil and groundwater remediation at RMI.	Initiate Remedial Actions at Fields Brook; continue offsite surface soil removal and groundwater remediation at RMI; continue RMI investigation.	Continue investigation soil and groundwater remediation at RMI; continue remedial actions at Fields Brook.
	Initiated interim corrective measures (ICM) of contaminated groundwater; continued underground storage tanks (UST) waste characterization; continued WAC 6 closure/remediation; initiated CAPCA closure at Y-12; performed closure activities on T/S/D units at Y-12; initiated cleanup in selected areas at K-25 at the Oak Ridge Reservation; continued investigation of RMI; initiated soil and groundwater studies; continued low-level waste shipments offsite.	Continue ICM of contaminated groundwater; initiate waste treatability studies and remedial action alternatives assessments for UST; further characterize UST wastes; continue WAC 6 closure/remediation; continue and complete CAPCA closures at Y-12; continue closure activities on T/S/D units at Y-12; initiate and continue cleanup in selected areas at K-25; provide support to design studies for fields brook; provide support for design studies groundwater and surface soil cleanup at RMI; shipments of potentially recoverable uranium and low-level wastes from RMI.	Continue ICM of groundwater; continue characterization, treatability studies and remedial action alternatives assessments on UST; initiate equipment design and fabrication for removal and treatment of tank contents; initiate post-closure activities associated with CAPCA at the Y-12 plant; initiate cleanup of on and offsite areas; continue RMI/Fields Brook restoration activities; continue shipment of contaminated surface soils offsite.

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III. Facilities and Sites (continued):

Program Activity	FY 1989	FY 1990	FY 1991
RCRA/CERCLA Cleanup (cont'd)	No activity.	No activity.	Prepare designs of Rocky Flats Plant Solar Ponds and landfill closures; initiate 811 Hillside RA and other closures; initiate cleanup of West Spray Field, Fuel Oil Tank Farm, Container Storage Areas, Pondcrete Storage Pads, and TRU Waste Tanks; continue preparation of associated NEPA documents.
	Began remedial design and action for fuel spill at Sandia National Laboratory (SNL) - Livermore.	Continue activities begun in prior year.	Complete RD/RA at SNL - Livermore; implement RD for cleanup at the Fuel Oil Spill.
	No activity.	Initiate Interim Remedial Actions at organically contaminated sites in Ohio, including the Miami-Erie Canal.	Continue Miami-Erie Canal remediation; begin RD/RA on contaminated groundwater at Mound Area B.
	Idaho Remedial Action (RA) begun on two Idaho Chemical Processing Plant (ICPP) units; completed closure on Mercury Contaminated Area Unit; initiated abandonment activities on the ICPP injection well.	Implement interim RA at Idaho National Engineering Laboratory (INEL) TRA warm waste pond; initiate cleanup actions at ICPP and INEL land disposal units per the Consent Order and Compliance Agreement (CDCA).	Continue activities as described in prior years; increase is for TAN injection well corrective measures and to accelerate remediation of non-compliant underground storage tanks at INEL.
	No activity.	Initiate landfill waste site closure activities at BNL.	Continue landfill waste site closure activities at BNL.
Subtotal, RCRA/CERCLA Cleanup	($11,530)	($20,915)	($59,847)
Total, RCRA/CERCLA	($75,396)	($211,572)	($263,868)

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III. Facilities and Sites (continued):

Program Activity	FY 1989	FY 1990	FY 1991
Decontamination and Decommissioning (D&D) Assessments	Conducted surveillance and maintenance of inactive facilities at Mound, New Brunswick Laboratory, INEL, Battelle Columbus Lab (BCL), ANL, ORNL, and Richland and continued RI/FS work; provided for surveillance and maintenance and asbestos removal at the shut-down high and low enriched uranium facilities at the Oak Ridge Gaseous Diffusion Plant (ORGDP); conducted planning to support decommissioning of the old HB line at Savannah River Site; issued draft EIS for Surplus Production Reactors at Hanford.	Continue surveillance and maintenance of inactive facilities at Mound, New Brunswick Laboratory, INEL, Santa Susana Field Laboratory (SSFL), ANL, BCL, ORNL, and Richland; continue surveillance and maintenance of PCB cleanup, and asbestos removal activities at the shutdown high and low enriched uranium facilities at ORGDP; publish the final Surplus Production Reactors Decommissioning EIS and ROD at Hanford; issue environmental documentation for removal of pitchblende contaminated soil at New Brunswick Laboratory site in New Jersey; issue ROD for Grand Junction RI/FS/EA; initiate development of a facility characterization system at INEL.	Continue surveillance and maintenance of inactive contaminated orphan facilities under the DOE Albuquerque, Chicago, Idaho, Oak Ridge, Richland, and San Francisco Operations Offices; initiate surveillance and maintenance for approximately 100 nonorphan facilities; provide for planning to support decommissioning nonorphan facilities at LLNL; supports surveillance and maintenance, safeguards and security, environmental compliance, and safety hazards/contamination control activities at the shutdown ORGDP process and support facilities.
	Conducted environmental restoration assessment for University of California (UC)-Davis surplus facilities.	Continue UC-Davis assessment activities.	Complete assessment of UC-Davis surplus facilities.
Subtotal, D&D Assessments	($24,959)	($27,304)	($59,856)

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III. Facilities and Sites (continued):

Program Activity	FY 1989	FY 1990	FY 1991
D&D Cleanup	Conducted ongoing projects at INEL, ORNL, BNL, Mound, and Richland; completed decontamination and relocation of the HTRE assemblies at INEL and demolition of the 115-B/C Gas Recirculation Building and 117-C Exhaust Filter Building at Richland; initiated cleanup activities at RMI and FMPC; and initiated decommissioning of SSFL Building 020 Hot Cells and in the Semi-Works Waste Disposal Building at Mound, and resume decommissioning the old HB Line at the Savannah River Site.	Conduct decommissioning projects at Mound, Grand Junction, INEL, ORNL, SSFL, Savannah River, and Richland; complete demolition of Special Metallurgical Building Annex and 4 Plutonium Processing (PP) Building support areas at Mound; conduct remediation work at Grand Junction; complete decommissioning of the Army Reentry Vehicle Facility Site at INEL; remove contaminated soil from 105-N Fuel Storage Basin; and initiate decommissioning of Auxiliary Reactor Area (ARA) III facilities at INEL.	Complete the Grand Junction Project Office Remedial Action Project; complete the PP Building and SW/Waste Disposal Building decommissioning projects at Mound and initiate cleanup of the SW Building Leachfield; initiate cleanup of the New Brunswick Laboratory site in New Jersey; continue the ARA III site decommissioning activities at INEL; complete decommissioning of the Hanford 100 B/C Area Ancillaries and soil removal from the 105-F and 105-H Fuel Storage Basins; continue old HB Line decommissioning activities at Savannah River; complete characterization of the 241-CX-71 Liquid Waste Tank and decommissioning of the 241-CX-72 Liquid Waste Tank at the Strontium Semiworks; continue cleanup activities at RMI and support PCB-contaminated ventilation system gasket control at DRGDP.
	Completed reactor pressure vessel (RPV) lift, transported via barge to Hanford, WA, and completed burial; completed remaining decontamination and decommissioning (D&D) for the Shippingport Station Decommissioning Project, PA with demolition of non-contaminated structures; completed site restoration activities.	Complete final reports, demobilize contractors and issue DOE site release.	No activity.

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III. Facilities and Sites (continued):

Program Activity	FY 1989	FY 1990	FY 1991
D&D Cleanup (cont'd)	Completed various project planning documents, radiological characterization, and permit applications for the Battelle Columbus Laboratories (BCL) Decommissioning Project, OH; prepared detailed cost estimates and the draft Decommissioning Plan; initiated non-contaminated equipment removal prior to decommissioning at BCL Buildings 1, 2, 3 and 6 at King Avenue, as well as JS-1, JS-10 and JS-12 at West Jefferson.	Continue ongoing D&D actions for the BCL Decommissioning Project, OH with available committed funding; complete 2 buildings at West Jefferson site.	Complete contaminated equipment removal and decommissioning at 2 buildings at King Avenue and 1 building at West Jefferson; initiate Building JW-1 decommissioning at West Jefferson; continue planned facility decommissioning.
	Completed structural decontamination of 10 Plutonium Processing (PP) Building support areas and the remaining three Research (R) Building support areas for the Mound Advanced Nuclear Systems and Projects Division (ANSPD) Area Decommissioning, OH; completed other Waste Transfer System (WTS) area contaminated soil removal and continued contaminated soil removal on the WTS Hillside.	Complete structural decontamination in the PP Building and the remaining contaminated soil removal from the WTS.	Issue final project report and complete ANSPD program in the first quarter.
	Completed removal of the condenser and circulating water system for the Experimental Boiling Water Reactor (EBWR), IL; initiated the disassembly and removal of the reactor vessel internals.	Complete removal of the reactor vessel internals; initiate cutting and packaging of the reactor vessel for disposal.	Continue cutting reactor vessel and packaging for disposal.

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III. Facilities and Sites (continued):

Program Activity	FY 1989	FY 1990	FY 1991
D&D Cleanup (cont'd)	Continued cleanout of the Pacific Northwest Laboratories (PNL) Building 324 and 325 Hot Cells for use by the Hanford Waste Vitrification Project (HWVP).	Carry out minimal D&D activities with available prior year funds.	Resume cleanout of Building 324 B-Cell area for use by the HWVP.
	Completed removal of piping, vacuum duct and sand from the pipe chase room at the Systems for Nuclear Auxiliary Power (SNAP) B Ground Prototype Test Facility, CA; completed removal of the Large Leak Test Rig (LLTR); completed planning for removal of balance of Building 059.	Complete mock-up of vacuum vessel; initiate removal, packaging and shipping of the reactor vacuum vessel; and begin removal of activated concrete and structural restoration of Building 059.	Initiate removal of activated concrete shield blocks; complete removal of reactor vacuum vessel; package and ship activated material from Building 059.
	Began cleanup of surplus facilities at UC-Davis.	Continue cleanup of UC-Davis.	Complete cleanup at UC-Davis.
	No activity.	No activity.	Close waste handling facility at LBL.

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III. Facilities and Sites (continued):

Program Activity	FY 1989	FY 1990	FY 1991
D&D Cleanup (cont'd)	Initiated physical decommissioning of Ultra-High Temperature Reactor Experiment (UHTREX), LN facility at Los Alamos; completed disposal of Sodium Cold Traps and lithium hydride at the Energy Technology Engineering Center (ETEC), CA; completed planning and initiated necessary remedial action of SPERT-IV Ancillaries at INEL.	Complete decommissioning of UHTREX, including reactor vessel removal and closeout activities at Los Alamos; complete decommissioning of the Water Boiler Reactor at Los Alamos; initiate and complete LAPRE decommissioning at Los Alamos; complete remedial action of the SPERT-IV Ancillaries at INEL; remove and prepare for disposal of Alpha boxes in the Chemistry and Metals Research Building Wing 9 hot cells at LANL; complete planning activities and turbine building decommissioning at the BORAX-V facility at INEL; plan and complete decommissioning of the Storage Garden at ORNL.	No activity.
Subtotal, D&D Cleanup	($55,347)	($56,156)	($58,624)
Total, D&D	($80,306)	($63,460)	($118,480)
Total Facilities and Sites	$286,622	$548,567	$720,720

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

Environmental Restoration

I. Preface: Formerly Utilized Sites Remedial Action Project (FUSRAP)

This budget activity provides for remedial action at privately owned former nuclear processing facilities that became contaminated as a result of Manhattan Engineer District (MED) or Atomic Energy Commission (AEC) work, or have been specifically assigned to DOE by Congress. This project, which is a DOE Major Systems Acquisition, provides for removal or control of the radiological and chemical contaminants for which DOE is responsible at designated properties which are contaminated above current guidelines. The waste from cleanup work is, generally, stored temporarily on the facility site which was the source of the contamination. Later, the source facility is decontaminated and the waste is either stabilized in place, removed to a host State disposal facility for large waste quantities, or transported to an established DOE disposal site for small waste quantities. The project strategy is to complete a comprehensive site search and screening process in FY 1990 that will establish total project scope and to implement both interim and final remedial actions under a project plan which completes the cleanup of all qualified sites currently in the project by approximately the year 2012. There are currently 31 sites under this Project, including five sites on the Environmental Protection Agency (EPA) National Priorities List (NPL), and additional sites may be added when the site search and screening process is complete. Remedial action has been completed on 9 of the 31 sites currently in the Project. An important aspect of the project strategy is the development and acquisition of disposal sites. To provide maximum flexibility, all activities are budgeted under operating expenses and include capital equipment and construction type activities. This is consistent with the manner in which Defense Programs Environmental Restoration activities were budgeted and approved by Congress.

This activity is included in the Environmental Restoration and Waste Management Five-Year Plan developed by DOE. It falls under the Environmental Restoration section of the Plan. The FY 1991 budget request and outyear budget profile is consistent with the Five-Year Plan. Of the four priority categories contained in the Five-Year Plan, all FUSRAP sites have been categorized as either Priority #1 or #2.

II. A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request	% Change
1. Assessment	$16,200	$10,736	$10,345	-4
2. Cleanup	6,030	3,907	25,855	+562
Total, FUSRAP	$22,230	$14,643	$36,200	+147

II. B. Major Laboratory and Facility Funding:

	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request	% Change
Argonne National Laboratory	$1,465	$1,325	$1,185	-11
Oak Ridge Associated Universities	490	470	630	+34
Oak Ridge National Laboratory	1,346	875	1,000	+14
Sandia National Laboratories	200	0	0	0

III. Activity Description:

Program Activity	FY 1989	FY 1990	FY 1991
FUSRAP			
Assessment	Prepared environmental documentation, conducted preliminary site characterization efforts, continued surveillance and maintenance of various sites. Some examples of activities are:	Prepare environmental documentation, conduct preliminary site characterization efforts, provide for surveillance and maintenance of various sites. Some examples of activities are:	Prepare environmental documentation, conduct preliminary site characterization efforts, provide for surveillance and maintenance of various sites. Some examples of activities are:
	Continued remedial investigation of Lodi properties at Maywood, NJ; publish scoping/planning documents; continue negotiating a Federal Facility Agreement (FFA) with EPA; continue technical and environmental support; continue site surveillance and maintenance.	Complete field investigation and start Remedial Investigation/ Feasibility Study - Environmental Impact Study (RI/FS-EIS) at Maywood, NJ; sign FFA with EPA; continue technical and environmental support and site surveillance and maintenance.	Continue RI/FS-EIS at Maywood, NJ; perform remedial investigation on Stepan property; complete characterization of Lodi vicinity properties; continue technical and environmental support and site surveillance and maintenance.
	Published scoping/planning documents for the Colonie, NY site; complete site remedial investigations and initiate RI/FS-Environmental Assessment (EA); provide technical and environmental support; continue surveillance and maintenance.	Continue RI/FS-EA for the Colonie, NY site; issue certification docket for FY 1988 and FY 1989 vicinity property work; provide technical and environmental support; continue surveillance and maintenance.	Finalize RI/FS-EA for the Colonie, NY site and begin Record of Decision (ROD).
	Continued negotiating a FFA with EPA for the Wayne/Pequannock, NJ site; publish off-site post-remedial action report; continue baseline risk assessment; initiate off-site certification docket; continue technical and environmental support; continue surveillance and maintenance.	Sign FFA with EPA for the Wayne/Pequannock, NJ site; complete site remedial investigations; initiate RI/FS-EIS documents; issue baseline risk assessment; publish off-site certification docket and scoping/planning documents; provide technical and environmental support; continue surveillance and maintenance.	Continue RI/FS-EIS for the Wayne/Pequannock, NJ site; continue surveillance and maintenance.

III. Formerly Utilized Sites Remedial Action Project (continued)

Program Activity	FY 1989	FY 1990	FY 1991
	Published chemical and geological investigation reports for the St. Louis Airport site (SLAPS), MO; continue surveillance and maintenance.	Initiate RI/FS-EIS for SLAPS; prepare scoping/planning documents; negotiate agreement with EPA and Missouri; continue surveillance and maintenance.	Publish scoping/planning documents for SLAPS; continue RI/FS-EIS documents; continue surveillance and maintenance.
	Initiated scoping/planning documents for the Hazelwood, MO site; prepare design for expansion of site interim storage capacity; issue draft characterization report for vicinity properties; continue surveillance and maintenance.	Continue scoping/planning documents for the Hazelwood, MO site; initiate RI/FS-EIS; lease Hazelwood Interim Storage Site (HISS) property; negotiate agreement with EPA and Missouri; continue surveillance and maintenance.	Publish scoping/planning documents for the Hazelwood, MO site; continue RI/FS-EIS documents.
	Drafted scoping/planning documents for the Ashland #1 and #2, NY sites; complete site remedial investigation; begin characterization report; provide technical and environmental support.	Publish scoping/planning documents and characterization report for the Ashland #1 and #2, NY sites.	Initiate RI/FS-EIS documents for the Ashland #1 and #2, NY sites.
	Completed site remedial investigation; draft scoping/planning documents for the Linde, NY site; begin characterization report; initiate well monitoring; provide technical and environmental support.	Publish scoping/planning documents and the characterization report for the Linde, NY site; complete well monitoring.	Initiate RI/FS-EIS for the Linde, NY site and remedial investigations at vicinity properties.
	Completed draft site selection plan; initiate large-area screening study for the New Jersey Disposal Site.	No activity.	No activity.
	Issued Phase II geologic investigation report for the New York Disposal Site; conduct groundwater well canvass; initiate baseline well monitoring; continue surveillance and maintenance.	Continue baseline well monitoring for the New York Disposal Site.	Initiate RI/FS-EIS documents for the New York Disposal Site.

III. Formerly Utilized Sites Remedial Action Project (continued)

Program Activity	FY 1989	FY 1990	FY 1991
	Performed Phase II remedial investigations for the St. Louis Downtown Site, MO site; prepare characterization reports; initiate well monitoring.	Initiate RI/FS-EIS for the St. Louis Downtown Site, MO; draft scoping/planning documents; complete well monitoring.	Initiate limited investigation of vicinity properties; publish scoping/planning documents for the St. Louis Downtown Site, MO; continue RI/FS-EIS.
	Prepared draft scoping/planning documents; provide technical and environmental support for the Seaway Industrial Park, NY.	Publish scoping/planning documents; perform site remedial investigation for the Seaway Industrial Park, NY site.	Initiate EI/FS-EIS documents for the Seaway Industrial Park, NY site.
	Continued radiological surveillance for the Palos Park, IL site.	Continue radiological surveillance for the Palos Park, IL site.	Continue radiological surveillance for the Palos Park, IL site.
Subtotal, Assessment	($16,200)	($10,736)	($10,345)
Cleanup	Conducted remedial actions, verified completion of cleanup efforts, issued final remedial action reports. Some examples are:	Conduct remedial actions, verify completion of cleanup efforts, issue final reports. Some examples are:	Conduct remedial actions, verify completion of cleanup efforts, issue final reports. Some examples are:
	Completed site characterization and decontaminate concrete pads at Elza Gate, TN.	No activity.	No activity.
	Performed interim remedial action and dispose of waste materials at Aliquippa Forge, PA.	No activity.	Initiate site environmental documentation at Aliquippa Forge, PA.
	Continued St. Louis Airport Site (SLAPS), Vicinity Properties (VP), MO remedial investigation along haul roads; issue draft characterization report for vicinity properties and haul roads; initiate scoping/planning documents; initiate vicinity property removal actions.	Publish vicinity property characterization report of the SLAPS, MO vicinity properties; continue scoping/planning documents; continue vicinity property removal actions; continue remedial investigation along haul roads; initiate RI/FS-EIS.	Publish scoping/planning documents of the SLAPS, MO vicinity properties; complete remedial investigation along haul roads; continue vicinity property removal actions; continue RI/FS-EIS documents.

III. Formerly Utilized Sites Remedial Action Project (continued)

Program Activity	FY 1989	FY 1990	FY 1991
	Issued post-remedial action report for work completed in FY 1988 and issue the draft certification docket for the U. of Chicago, IL site.	No activity.	No activity.
	Published Phase II characterization report for the Albany, OR site; complete design engineering for remaining work on site; publish post-remedial action report for work completed in prior years.	No activity.	Initiate Phase II remedial action for the Albany, OR site.
	Completed the certification docket and shipment of waste for disposal for the National Guard Armory, IL site.	No activity.	No activity.
	Continued site surveillance and maintenance at the Middlesex Sampling Plant, NJ.	Continue site surveillance and maintenance at the Middlesex Sampling Plant, NJ.	Continue site surveillance and maintenance; initiate site chemical characterization at the Middlesex Sampling Plant, NJ.
	Completed cleanup and post-remedial action report for approximately 15 vicinity properties and initiated certification docket.	No activity.	Remove asbestos and equipment from the Colonie, NY site building and initiate building demolition and removal; continue surveillance and maintenance.
	No activity	No activity	Initiate cleanup of vicinity properties at Hazelwood, MO site; continue surveillance and maintenance.
Subtotal, Cleanup	($6,030)	($3,907)	($25,855)
Total FUSRAP	$22,230	$14,643	$36,200

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

Environmental Restoration

I. Preface: Uranium Mill Tailings Remedial Action Project (UMTRAP)

Public Law 95-604, "The Uranium Mill Tailings Radiation Control Act of 1978", authorizes DOE to conduct a mill tailings stabilization and control program at 24 sites and an estimated 5,000 associated vicinity properties. The Environmental Protection Agency (EPA) is responsible for establishing standards governing the stabilization, control, and cleanup of the tailings, and the Nuclear Regulatory Commission (NRC) provides consultation and concurrence in the selection and performance of the remedial action at each site. The remedial action is conducted in accordance with cooperative agreements negotiated with the affected State or Indian Tribe under whose jurisdiction a site is located. The Federal Government (DOE) is responsible for paying 90 percent of the remedial action cost and the States the remaining 10 percent. When the sites are on Indian lands, the Federal Government pays the entire cost of the remedial action.

Project implementation is based on site priorities established by a health effects analysis, on maintaining a relatively constant budget profile, and on optimizing overall project management. The objective of the remedial action at the processing sites is to provide long-term environmental and public health and safety protection by either stabilizing the tailings on-site where feasible, or to remove the tailings to a new disposal site. Contaminated materials removed from the vicinity properties are disposed of with the processing site tailings. The final disposal site will be Federally (DOE) owned and maintained under a license issued by the NRC. For additional details on schedules and other site specific information, please refer to the 23 one page Operating Expense Funded Data Sheet Project Summaries and the consolidated UMTRAP Operating Expense Funded Data Sheet included with this submission. To provide maximum flexibility, all activities are budgeted under operating expenses and includes capital equipment and construction type activities. This is consistent with the manner in which Defense Programs Environmental Restoration activities were budgeted and approved by Congress.

Under Public Law 95-604, the Department's authority to perform remedial action on tailings terminates seven years after the EPA promulgated remedial action standards, unless that termination date is specifically extended by subsequent statute. EPA's standards became effective on March 7, 1983. An extension of the project until the end of FY 1994 was necessary due to budget constraints which made it impractical to seek or obtain the large annual appropriations required, and even with the additional funding, technical and administrative constraints made it impossible to complete the remaining work within the seven year time limit of the program's original authorization. Public Law 100-616, the "Uranium Mill Tailings Remedial Action Amendments Act of 1988," extended the period of authorization for conducting remedial action until the end of FY 1994.

This activity is included in the Environmental Restoration and Waste Management Five-Year Plan developed by DOE. It falls under the Environmental Restoration section of the Plan. The FY 1991 budget request and outyear budget profile is consistent with the Five-Year Plan. Of the four priority categories contained in the Five-Year Plan, all UMTRAP sites have been categorized as Priority #1 and #2.

II. A. Summary Tables:

Program Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request	% Change
1. Assessment	$ 24,468	$ 33,227	$ 30,587	-8
2. Cleanup	86,362	60,392	93,913	+56
Total, UMTRAP	$110,830	$ 93,619	$124,500	+33

II. B. Major Laboratory and Facility Funding:

	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request	% Change
Argonne National Laboratory	$ 95	$ 12	$ 0	-100
Brookhaven National Laboratory	290	200	200	0
Idaho National Engineering Laboratory	28	13	0	-100
Los Alamos National Laboratory	2,531	1,095	567	-48
Oak Ridge National Laboratory				

III. Activity Description:

Program Activity	FY 1989	FY 1990	FY 1991
Assessment	Performed site environmental documentation, site final design engineering, and Remedial Action Plans. Provided site surveillance and maintenance. Some examples are:	Perform site environmental documentation, site final design engineering, and Remedial Action Plans. Provide site surveillance and maintenance. Some examples are:	Perform site environmental documentation, site final design engineering, and Remedial Action Plans. Provide site surveillance and maintenance. Some examples are:
	Completed 90 percent of site environmental documentation and 80 percent of site final design engineering, and Remedial Action Plan for Slick Rock, CO.	Complete 95 percent of site planning and design for Slick Rock, CO.	Complete site planning and design for Slick Rock, CO.
	Completed 25 percent of environmental documentation, and 60 percent of site design engineering and Remedial Action Plan for Naturita, CO.	Complete environmental documentation, site final design engineering and Remedial Action Plan for Naturita, CO.	Continue planning and design support activities for Naturita, CO.
	Completed site environmental documentation, Remedial Action Plan, and design engineering for the Belfield/Bowman, ND sites.	Continue planning and design support activities for the Belfield/Bowman, ND sites.	Continue planning and design support activities for the Belfield/Bowman, ND sites.
	Completed site environmental documentation, site final design engineering, and Remedial Action Plan for the Falls City, TX site.	No activity.	No activity.
	Completed site environmental documentation and initiated site design engineering for Lowman, ID.	Complete site final design engineering and Remedial Action Plan for Lowman, ID.	Continue planning and design support activities for Lowman, ID.

III. Uranium Mill Tailings Remedial Action Project (continued)

Program Activity	FY 1989	FY 1990	FY 1991
	Completed site environmental documentation and site final design engineering for the Monument Valley, AZ site.	No activity.	No activity.
	Completed environmental documentation, 45 percent of site final design engineering, and Remedial Action Plan for Gunnison, CO.	Complete 95 percent of site final design and Remedial Action Plan for Gunnison, CO.	Complete site final design and Remedial Action Plan for Gunnison, CO.
	Completed environmental documentation, 55 percent of site final design engineering, and Remedial Action Plan for Maybell, CO.	Complete 95 percent of site final design engineering and Remedial Action Plan at Maybell, CO.	Complete all planning and design support activities for Maybell, CO.
	Completed site environmental documentation, site final design engineering, and Remedial Action Plan.	No activity.	No activity.
	Initiated site surveillance and maintenance at the Canonsburg, PA and Shiprock, NM sites.	Initiate site surveillance and maintenance at Green River, UT; Lakeview, OR; Salt Lake City, UT; and Spook, WY; continue site surveillance and maintenance at Canonsburg, PA and Shiprock, NM.	Initiate site surveillance and maintenance at Durango, CO; Riverton, WY; and Tuba City, AZ; continue site surveillance and maintenance at Canonsburg, PA; Green River, UT; Lakeview, OR; Salt Lake City, UT; Shiprock, NM; and Spook, WY.
	Conducted 1,262 vicinity property inclusion/exclusion recommendation surveys.	Conduct 348 vicinity property inclusion/exclusion recommendation surveys.	No activity.
Subtotal, Assessment	($24,468)	($33,227)	($30,587)
Cleanup	Conducted site acquisition efforts, performed remedial actions, conducted site certification efforts. Some examples are:	Conduct site acquisition efforts, perform remedial actions, conduct site certification efforts. Some examples are:	Conduct site acquisition efforts, perform remedial actions, conduct site certification efforts. Some examples are:

III. Uranium Mill Tailings Remedial Action Project (continued)

Program Activity	FY 1989	FY 1990	FY 1991
	Completed site acquisition and 14 percent of site remedial action at the Ambrosia Lake, NM site.	Continue site support activities and suspend site remedial action at the Ambrosia Lake, NM site until FY 1991 due to constrained FY 1990 budget.	Restart and complete 49 percent of the Ambrosia Lake, NM site remedial action and 56 percent of vicinity property remedial action.
	Initiated and completed 10 percent of site remedial action at Grand Junction, CO. Conduct 946 surveys (95 percent) and conduct remedial action at 658 vicinity properties (67 percent).	Complete 23 percent of site remedial action at Grand Junction, CO. Conduct 348 surveys (100 percent) and complete remedial action at 650 vicinity properties (88 percent).	Complete 51 percent of site remedial action and conduct remedial action at 489 vicinity properties at Grand Junction, CO.
	Completed site acquisition efforts; initiated and completed 62 percent of site remedial action at Green River, UT; completed 100 percent of vicinity property remedial action.	Complete site remedial action at Green River, UT; initiate and complete site certification.	No activity.
	Completed 31 percent of site remedial action at Mexican Hat, UT.	Complete 40 percent of site remedial action and suspend site remedial action until FY 1991 due to constrained FY 1990 budget at Mexican Hat, UT.	Resume site remedial action at Mexican Hat, UT and complete 87 percent of site remedial action and 100 percent of vicinity property remedial action.
	Initiated and completed 31 percent of site remedial action at Monument Valley, AZ.	Complete 40 percent of site remedial action and suspend site remedial action at Monument Valley, AZ until FY 1991 due to constrained FY 1990 budget.	Resume site remedial action at Monument Valley, AZ and complete 95 percent of site remedial action and 100 percent of vicinity property remedial action.
	Completed 99 percent of site remedial action at Lakeview, OR; initiated site certification.	Complete 100 percent of site remedial action at Lakeview, OR; initiate and complete site certification.	No activity.
	Completed 63 percent of the Durango, CO site remedial action; completed 100 percent of vicinity property remedial action.	Complete 95 percent of the Durango, CO site remedial action and initiate site certification.	Complete 100 percent of site remedial action at the Durango, CO site; complete site certification.

III. Uranium Mill Tailings Remedial Action Project (continued)

Program Activity	FY 1989	FY 1990	FY 1991
	Initiated site acquisition at the Falls City, TX site.	Initiate and complete 8 percent of the Falls City, TX site remedial action and 100 percent of vicinity property remedial action.	Complete 42 percent of site remedial action at the Falls City, TX site.
	Initiated and completed 100 percent of site and vicinity property remedial action at Spook, WY.	Initiate and complete site certification at Spook, WY.	No activity.
	Completed 95 percent of site remedial action at Tuba City, AZ.	Complete 100 percent of site remedial action at Tuba City, AZ. Initiate site certification.	Complete site certification at Tuba City, AZ.
	Completed 88 percent of site remedial action and 100 percent of Riverton, WY vicinity property remedial action.	Complete 100 percent of site remedial action and initiate site certification at Riverton, WY.	Complete site certification at Riverton, WY.
	Completed 10 percent of site remedial action and 20 percent of vicinity property remedial action at Rifle, CO; conduct 30 vicinity property surveys.	Complete 44 percent of vicinity property remedial actions at Rifle, CO and suspend site remedial action until FY 1991 due to constrained FY 1990 budget.	Resume remedial action at Rifle, CO and complete 34 percent of site remedial action and 100 percent of vicinity property remedial action.
	No activity.	Initiate site acquisition for Naturita, CO.	Complete site acquisition for Naturita, CO.
	No activity.	Initiate site acquisition for Maybell, CO.	Complete site acquisition for Maybell, CO.
	Initiated site acquisition for Gunnison, CO.	Continue site acquisition for Gunnison, CO.	Initiate and complete 14 percent of site remedial action and 100 percent of vicinity property remedial action at Gunnison, CO.

III. Uranium Mill Tailings Remedial Action Project (continued)

Program Activity	FY 1989	FY 1990	FY 1991
	Completed 100 percent of site remedial action and initiated site certification for Salt Lake City, UT.	Complete site certification at Salt Lake City, UT.	No activity.
	No activity.	Complete 48 percent of vicinity property remedial action and initiate site acquisition for Lowman, ID site.	Complete vicinity property remedial action and complete site acquisition for Lowman, ID site.
	Completed site certification at Shiprock, NM.	No activity.	No activity.
	Completed site certification at Canonsburg, PA.	No activity.	No activity.
	Initiated 737 vicinity property remedial action starts.	Initiate 705 vicinity property remedial action starts.	Initiate 489 vicinity property remedial action starts.
Subtotal, Cleanup	($86,362)	($60,392)	($93,913)
TOTAL UMTRAP	$110,830	$93,619	$124,500

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollar in thousands)

KEY ACTIVITY SUMMARY - OPERATING EXPENSE PROJECTS
Environmental Restoration

IV. Operating Expense Funded Data Sheet
Summary Table (DOE)

	Project Title	Total Prior Year Obligations	FY 1990 Request	FY 1991 Request	Remaining Balance	TEC (DOE)
1.	Ambrosia Lake Uranium Mill Tailings Project (NM)	$ 13,296	$ 1,260	$ 8,799	$ 18,800	$ 42,155
2.	Belfield/Bowman Uranium Mill Tailings Project (ND)	7,653	644	1,246	10,580	20,123
3.	Canonsburg Uranium Mill Tailings Project (PA)	43,224	515	549	1,375	45,663
4.	Durango Uranium Mill Tailings Project (CO)	47,504	13,126	358	562	61,550
5.	Edgemont Vicinity Properties Project (SD)	5,007	0	0	0	5,007
6.	Falls City Uranium Mill Tailings Project (TX)	7,996	4,433	10,860	17,125	40,414
7.	Grand Junction Uranium Mill Tailings Project (CO)	146,076	41,340	54,092	76,555	318,063
8.	Green River Uranium Mill Tailings Project (UT)	17,787	1,153	308	687	19,935
9.	Gunnison Uranium Mill Tailings Project (CO)	12,447	3,421	4,371	26,012	46,251
10.	Lakeview Uranium Mill Tailings Project (OR)	28,184	735	256	983	30,158
11.	Lowman Uranium Mill Tailings Project (ID)	5,764	4,063	2,710	5,490	18,027
12.	Maybell Uranium Mill Tailings Project (CO)	5,910	2,251	616	10,086	18,863
13.	Mexican Hat Uranium Mill Tailings Project (UT)	22,031	5,314	9,946	7,020	44,311
14.	Monument Valley Uranium Mill Tailings Project (AZ)	8,758	966	9,268	1,493	20,485
15.	Naturita Uranium Mill Tailings Project (CO)	6,754	2,322	883	20,049	30,008
16.	Rifle Uranium Mill Tailings Project (CO)	18,907	4,652	17,968	51,193	92,720
17.	Riverton Uranium Mill Tailings Project (WY)	43,150	0	0	471	43,621
18.	Salt Lake City Uranium Mill Tailings Project (UT)	80,830	292	0	-121	81,001
19.	Shiprock Uranium Mill Tailings Project (NM)	20,416	504	471	1,014	22,405
20.	Slick Rock Uranium Mill Tailings Project (CO)	6,112	940	596	13,242	20,890
21.	Spook Uranium Mill Tailings Project (WY)	9,118	493	447	755	10,813
22.	Tuba City Uranium Mill Tailings Project (AZ)	22,880	5,195	756	717	29,548
23.	UMTRA Groundwater Restoration (Various Locations)	0	0	1,000	1,208,079	1,209,079
24.	Shippingport Station Decommissioning Project (PA)	91,850	450	0	0	92,300
25.	Weldon Spring Site Remedial Action Project (MO)	39,914	9,400	27,332	357,452	434,098
26.	Feed Materials Production Center (OH)	27,092	23,000	39,000	943,008	1,032,100
	TOTAL	$738,660	$126,469	$191,832	$2,772,627	$3,829,588

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Ambrosia Lake Uranium Mill Tailings Project
Ambrosia Lake, New Mexico

Project TEC: $ 42,155 (DOE)
Start Date: 9/87*
Completion Date: 9/93*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$11,882	$ 1,414	$ 1,260	$ 8,799	$18,800

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) Complete 49 percent of site remedial action and 56 percent of vicinity property remedial action through FY 1991.

* Start and completion dates refer to processing site remedial action schedule.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Belfield/Bowman Uranium Mill Tailings Project, Belfield and Bowman, North Dakota

Project TEC: $ 20,123 (DOE)
Start Date: 4/93*
Completion Date: 9/93*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$ 6,208	$ 1,445	$ 644	$ 1,246	$10,580

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include continuation of planning and design support.

* Start and completion dates refer to processing site remedial action schedule.

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KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Canonsburg Uranium Mill Tailings Project
Canonsburg, Pennsylvania

Project TEC: $ 45,663 (DOE)
Start Date: 10/83*
Completion Date: 12/85*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$ 42,808	$ 416	$ 515	$ 549	$ 1,375

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include continuation of site surveillance and maintenance.

* Start and completion dates refer to processing site remedial action schedule.

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KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Durango Uranium Mill Tailings Project
Durango, Colorado

Project TEC: $ 61,550 (DOE)
Start Date: 10/86*
Completion Date: 11/90*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$38,095	$ 9,409	$13,126	$ 358	$ 562

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include completion of site remedial action certification and initiation of surveillance and maintenance.

* Start and completion dates refer to processing site remedial action schedule.

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(dollars in thousands)

KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Edgemont Vicinity Properties Project
Edgemont, South Dakota

Project TEC: $ 5,007 (DOE)
Start Date: 8/83*
Completion Date: 12/88*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$ 5,007	$ 0	$ 0	$ 0	$ 0

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) No activities scheduled in FY 1991.

* Start and completion dates refer to the vicinity property remedial action schedule.

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(dollars in thousands)

KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Falls City Uranium Mill Tailings Project
Falls City, Texas

Project TEC: $ 40,414 (DOE)
Start Date: 8/90*
Completion Date: 7/93*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$ 6,618	$ 1,378	$ 4,433	$10,860	$17,125

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include completion of 42 percent of site remedial action.

* Start and completion dates refer to processing site remedial action schedule.

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(dollars in thousands)

KEY ACTIVITY SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Grand Junction Uranium Mill Tailings Project
Grand Junction, Colorado

Project TEC: $ 318,063 (DOE)
Start Date: 12/88*
Completion Date: 11/93*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$104,584	$41,492	$41,340	$54,092	$76,555

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include completion of 51 percent of site remedial action, and conducting remedial action at 489 vicinity properties.

* Start and completion dates refer to processing site remedial action schedule.

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(dollars in thousands)

KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Green River Uranium Mill Tailings Project
Green River, Utah

Project TEC: $ 19,935 (DOE)
Start Date: 10/88*
Completion Date: 12/89*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$13,173	$ 4,614	$ 1,153	$ 308	$ 687

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include continuation of site surveillance and maintenance.

* Start and completion dates refer to processing site remedial action schedule.

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(dollars in thousands)

KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Gunnison Uranium Mill Tailings Project
Gunnison, Colorado

Project TEC: $ 46,251 (DOE)
Start Date: 5/90*
Completion Date: 9/94*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$10,800	$ 1,647	$ 3,421	$ 4,371	$26,012

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include completion of 14 percent of site remedial action and 100 percent of vicinity property remedial action.

* Start and completion dates refer to processing site remedial action schedule.

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(dollars in thousands)

KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Lakeview Uranium Mill Tailings Project
Lakeview, Oregon

Project TEC: $ 30,158 (DOE)
Start Date: 6/86*
Completion Date: 10/89*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$25,898	$ 2,286	$ 735	$ 256	$ 983

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include continuation of site surveillance and maintenance.

* Start nd completion dates refer to processing site remedial action schedule.

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KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Lowman Uranium Mill Tailings Project
Lowman, Idaho

Project TEC: $ 18,027 (DOE)
Start Date: 4/93*
Completion Date: 9/93*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$ 5,507	$ 257	$ 4,063	$ 2,710	$ 5,490

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include completion of vicinity property remedial action, site acquisition and continuation of planning and design support activities.

* Start and completion dates refer to processing site remedial action schedule.

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(dollars in thousands)

KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Maybell Uranium Mill Tailings Project
Maybell, Colorado

Project TEC: $ 18,863 (DOE)
Start Date: 4/92*
Completion Date: 10/93*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$ 5,170	$ 740	$ 2,251	$ 616	$10,086

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include completion of planning and design activities and site acquisition.

* Start and completion dates refer to processing site remedial action schedule.

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KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Mexican Hat Uranium Mill Tailings Project
Mexican Hat, Utah

Project TEC: $ 44,311 (DOE)
Start Date: 7/87*
Completion Date: 4/92*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$13,994	$ 8,037	$ 5,314	$ 9,946	$ 7,020

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include completion of 87 percent of site remedial action and 100 percent of vicinity property remedial action.

* Start and completion dates refer to processing site remedial action schedule. Phase I completed 11/87 and Phase II started 9/88.

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KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Monument Valley Uranium Mill Tailings Project
Monument Valley, Arizona

Project TEC: $ 20,485 (DOE)
Start Date: 5/89*
Completion Date: 4/92*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$ 6,564	$ 2,194	$ 966	$ 9,268	$ 1,493

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include completion of 95 percent of site remedial action and 100 percent of vicinity property remedial action.

* Start and completion dates refer to processing site remedial action schedule.

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KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Naturita Uranium Mill Tailings Project
Naturita, Colorado

Project TEC: $ 30,008 (DOE)
Start Date: 4/92*
Completion Date: 9/94*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$ 5,601	$ 1,153	$ 2,322	$ 883	$20,049

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include completion of site acquisition and continuation of planning and design activities.

* Start and completion dates refer to processing site remedial action schedule.

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KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Rifle Uranium Mill Tailings Project
Rifle, Colorado

Project TEC: $ 92,720 (DOE)
Start Date: 9/88*
Completion Date: 9/94*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$15,109	$ 3,798	$ 4,652	$17,968	$51,193

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include completion of 34 percent of site remedial action and 100 percent of vicinity property remedial action.

* Start and completion dates refer to processing site remedial action schedule. (Phase I completed 9/89 and Phase II starts 10/90).

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KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Riverton Uranium Mill Tailings Project
Riverton, Wyoming

Project TEC: $ 43,621 (DOE)
Start Date: 5/88*
Completion Date: 9/90*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$23,146	$20,004	$ 0	$ 0	$ 471

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include completion of site certification and initiation of surveillance and maintenance.

* Start and completion dates refer to processing site remedial action schedule.

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KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Salt Lake City Uranium Mill Tailings Project
Salt Lake City, Utah

Project TEC: $ 81,001 (DOE)
Start Date: 2/85*
Completion Date: 6/89*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$80,673	$ 157	$ 292	$ 0	$ (121)

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include continuation of site surveillance and maintenance.

* Start and completion dates refer to processing site remedial action schedule.

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KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Shiprock Uranium Mill Tailings Project
Shiprock, New Mexico

Project TEC: $ 22,405 (DOE)
Start Date: 10/84*
Completion Date: 11/86*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$20,079	$ 337	$ 504	$ 471	$ 1,014

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include continuation of site surveillance and maintenance.

* Start and completion dates refer to processing site remedial action schedule.

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(dollars in thousands)

KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Slick Rock Uranium Mill Tailings Project
Slick Rock, Colorado

Project TEC: $ 20,890 (DOE)
Start Date: 4/92*
Completion Date: 8/93*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$ 5,585	$ 527	$ 940	$ 596	$13,242

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include completion of site acquisition and planning and design.

* Start and completion dates refer to processing site remedial action schedule.

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(dollars in thousands)

KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Spook Uranium Mill Tailing Project
Spook, Wyoming

Project TEC: $ 10,813 (DOE)
Start Date: 4/89*
Completion Date: 9/89*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$ 6,117	$ 3,001	$ 493	$ 447	$ 755

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include continuation of surveillance and maintenance.

* Start and completion dates refer to processing site remedial action schedule.

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KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Tuba City Uranium Mill Tailings Project
Tuba City, Arizona

Project TEC: $ 29,548 (DOE)
Start Date: 12/85*
Completion Date: 1/90*

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$16,356	$ 6,524	$ 5,195	$ 756	$ 717

C. Narrative:

(1) The Uranium Mill Tailings Radiation Control Act of 1978, Public Law 95-604, authorizes the Department of Energy (DOE) to undertake remedial actions at 24 designated inactive uranium processing sites and associated vicinity properties.
(2) The purpose of the remedial actions is to stabilize and control the uranium mill tailings and other residual radioactive materials in a safe and environmentally sound manner in order to minimize radiation health hazards to the public.
(3) FY 1991 activities include completion of site certification and initiation of surveillance and maintenance.

* Start and completion dates refer to processing site remedial action schedule. (Phase I completed 2/86 and Phase II started 1/88).

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(dollars in thousands)

KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Uranium Mill Tailings Groundwater Restoration Project, Various Locations

Project TEC: $1,209,079 (DOE) 1/
Start Date: 10/1990
Completion Date: 9/2067

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$ 0	$ 0	$ 0	$ 1,000	$1,208,079

C. Narrative:

(1) The objective of this project is to characterize and restore, as necessary, the aquifers at 24 designated uranium mill tailings sites to comply with EPA groundwater protection standards.
(2) Specifically, in FY 199: activities will include site characterization, technology development, and a technical approach document.
(3) Total cost represents cost of the project through FY 2067. Final standards are not expected to be promulgated by the Environmental Protection Agency until early 1990. (This is the first year funding is being requested for this project.)

1/ TEC includes escalation through FY 1998 only. Escalation of total project through FY 2067 at the rate of 6 percent would identify a TEC of $6,154,900,000

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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Shippingport Station
Decommissioning Project
Shippingport, Pennsylvania

Project TEC: $ 92,300 (DOE)
Start Date: 3/79
Completion Date: 3/90

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$87,850	$ 4,000	$ 450	$ 0	$ 0

C. Narrative:

(1) The Shippingport Atomic Power Station operated from 1957 to 1982. The Station was transferred to this program in 1984 for decommissioning. The decommissioning mode selected for the Shippingport Station Decommissioning Project (SSDP) was prompt removal/dismantlement, involving removal from the site of all radioactivity above levels permitted for unrestricted use of the property. The radioactive waste is disposed of at the DOE Hanford site.

(2) The SSDP will place the Station in a radiologically safe condition, demonstrate the practical dismantlement of a commercial nuclear power reactor, and provide useful data for future decommissioning projects.

(3) Physical decommissioning was completed in FY 1989, and site restoration began. Site restoration will be completed in the first quarter of fiscal year 1990. Also, in fiscal year 1990, records and document archiving and contractors will be demobilized so that the site can be released by the end of the second quarter.

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(dollars in thousands)

KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project Title and Location: Weldon Spring Site
Remedial Action Project
Weldon Spring, Missouri

Project TEC: $434,098 (DOE)
Start Date: 10/1981
Completion Date: 10/1998

B. Financial schedule:
(Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$ 27,314	$ 12,600	$ 9,400	$ 27,332	$357,452

C. Narrative:

(1) The Weldon Spring Site Remedial Action Project has been designated as a DOE Major Systems Acquisition with the objective of remediating hazardous conditions at the site. The Quarry portion of the project is listed on the National Priority List, and EPA has proposed to expand the listing to include the rest of the project. This is a jointly funded project with the Department of Army (DA). The Total Project Cost Estimate (TPCE) is $594,024 with the DA share of $159,926 and the DOE share identified above.
(2) The purpose of the Project is to decontaminate the Weldon Spring Quarry, Raffinate Pits, Chemical Plant and Vicinity Properties, and provide for long-term management of the wastes in a safe and environmentally sound manner.
(3) FY 1991 work will include the following: Issue a Record of Decision for the site; award, design and startup operation of site waste water treatment plant; complete construction of the haul road from the Quarry to the site; complete construction of temporary storage area and begin operation; initiate excavation of contaminated material from Quarry; complete demolition of 6 chemical plant buildings and begin removal of site railroad and 5 additional buildings; and complete remedial action at Army and Busch vicinity properties.

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KEY ACTIVITY DATA SHEET SUMMARY
Environmental Restoration

IV. Operating Expense Funded Data Sheet

A. Project title and location: Feed Materials Production Center (FMPC), Oak Ridge, Tennessee

Project TPCE: $ 1,032,100 (DOE)
Start Date: 9/91
Completion Date: 9/2001

B. Financial schedule: (Budget Authority)

Prior Year	FY 1989 Actual	FY 1990 Appropriated	FY 1991 Request	To Complete
$17,347	$ 9,745	$23,000	$39,000	$943,008

C. Narrative:

(1) In accordance with the requirements of the Federal Facilities Compliance Agreement (FFCA) and CERCLA (as amended), the Feed Materials Production Center (FMPC) proposes to implement a comprehensive Environmental Remedial Actions (ERA) Project. The purpose of the FMPC/ERA Project is to implement the selected remedial action alternatives identified by the EPA in the Records of Decision (RODs) issued in response to the FMPC Remedial Investigation/Feasibility Studies (RI/FS). Item H of the CERCLA section of the FFCA provides that DOE implement the selected alternatives identified by the RODs. The RI/FS activities at the FMPC are being conducted pursuant to the requirements of the FFCA and the applicable sections of CERCLA (as amended). The FFCA contains enforcement provisions requiring the DOE to implement actions on a specified schedule. Failure to meet the schedule provisions of the FFCA could result in fines or civil actions.

(2) Facilities potentially requiring remedial action, as identified in the preliminary assessment, include the six waste pits, clearwell, burnpit, sanitary landfill, flyash piles, K-65 and other Silos, southfield area, deactivated facilities, underground storage tanks, and other inactive facilities. Other potential actions include general site-wide soil cleanup, offsite soil cleanup, sediment removal, pathway modifications, and groundwater restoration.

(3) In FY 1991, finalization of schedule for RI/FS activities for Operable Units and activities include initiation of removal actions (1) K-65 Silo; (2) storm water runoff; (3) perched groundwater; and (4) south plume.

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KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Environmental Restoration

IV. A. Construction Project Summary

Project No.	Project Title	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Unappropriated Balance	TEC
90-R-402	Partial Decontamination and Medium Term Protective Storage of the Argonne National Laboratory CP-5 Research Reactor (IL)	$ 0	$1,000	$4,400	$ 0	$ 5,400
89-R-113	Environmental Upgrades, Brookhaven National Laboratory (NY)	1,500	3,262	3,000	1,838	9,600
Total, Construction		$1,500	$4,262	$7,400	$1,838	$15,000

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Environmental Restoration
Facilities and Sites

IV. B. Plant Funded Construction Project

1. Project title and location: 90-R-402 Partial Decontamination and Medium-Term (5-25 years) Protective Storage of the ANL CP-5 Research Reactor
Argonne National Laboratory
Argonne, Illinois

Project TEC: $ 5,400
Start Date: FY 1990
Completion Date: FY 1992

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1990	$1,000	$1,000	$1,000
1991	4,400	4,400	2,500
1992	0	0	1,900

3. Narrative:

(a) This project will provide safe medium-term (5-25 year) protective storage of the CP-5 research reactor with minimal surveillance and maintenance cost over the period of protective storage. All radioactively contaminated or otherwise potentially hazardous material external to the reactor biological shield process system will be removed and appropriately disposed. Wall and floor surfaces will be decontaminated. Beam tubes and other penetrations into the biological shield will be sealed to preclude access to the radioactive reactor internals. The process piping and equipment on the service floor will be removed and disposed of. Intrusion alarms will be installed. The reactor containment building (roof and circular wall) will be rehabilitated to ensure structural integrity and prevent water leaks during protective storage. A number of small outbuildings and facilities, e.g., cooling towers, formerly required for reactor operation and/or experimental programs, will be demolished.

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(b) The contaminated material to be removed and disposed of includes: (1) abandoned used experimenters' equipment on the experimental floor; (2) obsolete experimenter and reactor maintenance equipment in storage in the yard and outbuildings; (3) irradiated sample and obsolete in-reactor experiments' equipment shielded below-grade storage tubes (rod storage areas) and in storage under water in the spent-fuel canal facility; and (4) process piping and equipment on the reactor service floor.

(c) FY 1991 funding of $4,400,000 is requested to continue construction for the medium term protective storage of the CP-5 Research Reactor and meet completion date of 4th quarter FY 1992.

A. Total Project Funding (BA):	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction.....	$ 0	$ 0	$1,000	$4,400	$ 0
Capital Equipment.....	0	0	0	0	0
Operating Expenses.....	0	0	0	0	0

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Environmental Restoration
Facilities and Sites

IV. B. Plant Funded Construction Project

1. Project title and location: 89-R-113 Environmental upgrades, Brookhaven National Laboratory (BNL) Upton, New York

Project TEC: $ 9,600
Start Date: FY 1989
Completion Date: FY 1992

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1989	$1,500	$1,500	$1,000
1990	3,262	3,262	2,500
1991	3,000	3,000	3,062
1992	1,838	1,838	3,038

3. Narrative:

(a) This project will close a landfill site and stabilize the potential leachate from the area and will remove radioactive sludge as well as holding tanks at a waste processing facility. Decontamination and disposal will be conducted on three 100,000 gallon above ground tanks located at the radioactive liquid waste concentration facility. Environmental monitoring improvement phase of the project is designed to meet changing operational and regulatory needs.

(b) The purpose of this project is to take action to prevent, control, and abate environmental pollution.

(c) $3,000,000 is requested for FY 1991 funding. Construction will start in early FY 1990, and be well underway in FY 1991.

4. Total Project Funding (BA):	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction.....	$ 0	$1,500	$3,262	$3,000	$1,838
Capital Equipment.....	0	0	0	0	0
Operating Expenses.....	0	0	0	0	0

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LEAD TABLE

WASTE MANAGEMENT

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Operating Expenses	$ 841,591	$1,020,091	$1,020,091	$1,365,717	$ 345,626	+34%
Capital Equipment	51,012	45,093	45,093	82,805	37,712	+84%
Construction	202,676	182,519	182,519	303,790	121,271	+66%
Total, Waste Management	$1,095,279	$1,247,703	$1,247,703	$1,652,312	$ 404,609	+32%

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SUMMARY OF CHANGES

FY 1990 Appropriation	$1,247,703
Adjustments	0
FY 1991 Base	$1,247,703
· Increase in Waste Management activities to begin physical construction of the Hanford Waste Vitrification Plant at Richland, to upgrade the High Level Waste Tank Farm at Idaho, and to initiate design of the Waste Receiving and Processing Facility at Richland	+42,536
· Assume operation of PUREX in support of waste management activities in the fourth quarter FY 1991	+34,000
· Initiate first year construction activities in support of Waste Management at Mound Plant ($284K), Brookhaven National Laboratory ($500K), Pacific Northwest Laboratory ($2,770K), and Savannah River ($5,800K)	+ 9,354
· Increase in Waste Management activities connected with the treatment, storage, and disposal of all radioactive, hazardous, mixed or sanitary wastes	+ 298,719
FY 1991 Congressional Request	$1,632,312

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KEY ACTIVITY SUMMARY

1. Preface: Waste Management (Operating Expenses)

The goal of the Waste Management program is to provide safe, environmentally acceptable treatment, storage, and disposal of Department of Energy (DOE) radioactive, hazardous, mixed, and sanitary waste, to protect the workers, public, and the environment, and support defense production requirements derived from the annual Presidentially-approved Nuclear Weapons Stockpile Memorandum (NWSM), the Naval nuclear propulsion activities and other Department missions. The program includes the operation and maintenance of high-level waste (HLW) storage tanks, bins, and related treatment and storage facilities; the operation and maintenance of low-level waste (LLW) treatment, storage, and disposal facilities; the treatment and retrievable storage of transuranic (TRU) waste at several sites; the operation of TRU waste certification facilities at several sites; the operation of low-level liquid and gaseous waste treatment, storage and disposal facilities; and the operation of three filter testing facilities.

With the FY 1991 request, DOE is committing itself to pursue compliance with all applicable federal, State, and local requirements, and to effectively execute DOE's waste management programs. DOE has committed to waste management and environmental restoration activities at several sites. At Richland this was done through execution of a Tri-Party Agreement (TPA) with the U.S. Environmental Protection Agency and the State of Washington. To ascertain the need for additional compliance actions at all of its sites, DOE is negotiating with EPA and the states on such issues as corrective activities for retrievably stored TRU waste and HLW stored in tanks, container inspection and storage requirements, regulatory closure times for mixed waste treatment, storage, and disposal (T/S/D) units, and RCRA alternative permitting procedures for units such as WIPP, HLW vitrification plants and LLW grouting. Increases are necessary for system modifications required to meet more stringent ES&H requirements. Finally, an assessment of compliance costs to meet both external and internal regulations has resulted in increased program costs at all sites. The request for FY 1991 also reflects programmatic increases for waste removal activities necessary to maintaining DWPF hot start-up in FY 1992. Activities at the Waste Isolation Pilot Plant are funded to respond to Performance Assessment requirements and emplace the required amount of waste in the early years of operation.

The goal of the Low-Level Waste Program, now included in Waste Management, is to facilitate the establishment of a reliable nationwide system for management of commercial low-level radioactive waste by implementing responsibilities assigned DOE under P.L. 99-240, the "Title I Low-level Radioactive Waste Policy Amendments Act of 1985."

The goal of the West Valley Demonstration Project, now included in Waste Management, is to demonstrate solidification for disposal of HLW under the provisions of P.L. 96-368, the "West Valley Demonstration Project Act" enacted in 1980. The Project is carrying out an integrated production-scale development and demonstration project for treating the 600,000 gallons of alkaline and acidic liquid HLW stored at the Western New York Nuclear Service Center, near West Valley. The Center reprocessed spent nuclear fuel from 1966 to 1972. Major activities embodied in the project include: (1) decontamination required to prepare existing facilities and equipment; (2) removal of the wastes from the underground storage tanks; (3) development, design, construction, and operation of systems for solidification of the waste; (4) acquisition of disposal containers; (5) temporary storage and transportation of the solidified waste; (6) decontamination and decommissioning (D&D) of the waste tanks, facilities, hardware, and material used in carrying out the project; and (7) disposal of LLW and TRU waste produced from project activities. In FY 1991, the Project will be focused on the critical elements that support processing and solidification of the liquid HLW. Current plans are for start of solidification of HLW by October 1993 within a Total Project Cost (TPC) of $890 million (Phase I-through the end of solidification). The DOE share of the TPC is $801 million, with the balance of $89 million contributed by the State of New York.

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II. A. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Waste Management				
Continuity of Operations	$ 201,739	$ 264,348	$ 283,262	+7
Waste Minimization	3,598	4,453	4,034	-9
Waste Isolation Pilot Plant	125,027	79,060	112,237	+42
Defense Waste Processing Facility	127,645	134,097	139,763	+4
Hanford Waste Vitrification Plant	9,820	16,056	23,000	+43
Treatment	121,474	162,188	246,657	+52
Storage	85,637	81,152	103,761	+28
Disposal	81,775	116,393	167,603	+44
West Valley Demonstration Project	46,500	87,360	90,000	+3
Low-Level Waste Program	5,000	4,812	11,500	+139
Waste Technology and Byproducts	564	562	0	0
Program Support	13,812	79,628	92,950	+17
Subtotal, Waste Management	$ 841,591	$1,020,091	$1,265,717	+24
II.B. Major Laboratory and Facility Funding:				
Argonne National Laboratory	$ 2,500	$ 2,023	$ 3,552	+76
Idaho National Engineering Laboratory	127,736	171,817	191,566	+11
Lawrence Livermore National Laboratory	6,472	11,017	14,611	+31
Los Alamos National Laboratory	21,438	19,864	26,454	+33
Oak Ridge National Laboratory	10,254	12,724	13,293	+4
Pacific Northwest Laboratory	5,172	3,944	6,276	+59
Rocky Flats Plant	36,665	44,891	43,317	+1
Sandia National Laboratories	4,897	3,845	4,914	+28
Westinghouse Hanford Company	186,179	212,947	307,511	+44
Westinghouse Savannah River	239,584	307,847	377,302	+23
Westinghouse (WIPP)	125,027	79,060	112,237	+42

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III. Activity Description: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Continuity of Operations	Assured continuity of base waste management operations through recordkeeping/reporting requirements and site maintenance. Continued programs to minimize waste generation. Continued sitewide comprehensive environmental monitoring and effluent sampling program. Performed operations at AL, ID, OR, RL, SR and SAN to examine and certify TRU waste for shipment to WIPP. Continued USGS geohydrologic studies at ID. Continued preoperational testing, safety assessment, and preparation of operating manuals, test procedures and other operational documentation as required for waste management facilities.	Assure continuity of base waste management operations through recordkeeping/reporting requirements and site maintenance. Continue programs to minimize waste generation. Continued sitewide comprehensive environmental monitoring and effluent sampling program. Perform operations at AL, ID, OR, RL, SR and SAN to examine and certify TRU waste for shipment to WIPP. Continue USGS geohydrologic studies at ID. Continue preoperational testing, safety assessment, and preparation of operating manuals, test procedures and other operational documentation as required for waste management facilities.	Continues safe and efficient base waste management operations; site maintenance and evaluation and radiological monitoring activities. Continues waste acceptance criteria efforts. Continues performance assessment studies and enhancement of waste minimization programs. Continues comprehensive sitewide environmental monitoring and effluent sampling program. Continues USGS geohydrologic studies at ID. Continues operations to examine and certify TRU waste for shipment to WIPP. Continues technical support required for waste management facilities.
	Continued preparation of conceptual designs and engineering and safety studies to support future construction and equipment procurements. Continued facility and equipment upgrades and maintenance required for safety and operability. Continued operator training programs. Continued development, implementation, monitoring and documentation of maintenance, safety, operational, environmental, and QA programs and requirements including independent reviews. Prepared compliance plans. Continued comprehensive corrective and preventive maintenance program for waste management systems and facilities.	Continue preparation of conceptual designs and engineering and safety studies to support future construction and equipment procurements. Continue facility and equipment upgrades and maintenance required for safety and operability. Continue operator training programs. Continue development, implementation, monitoring and documentation of maintenance, safety, operational, environmental, and QA programs and requirements including independent reviews. Prepare compliance plans. Continue comprehensive corrective and preventive maintenance program for waste management systems and facilities.	Continues preparation of conceptual designs and engineering and safety studies to support future construction and equipment procurements. Continues facility and equipment upgrades and maintenance required for safety and operability. Continues operator training programs. Continues implementation and monitoring of maintenance, safety, and QA programs. Continues independent safety reviews and QA audits of waste management systems and facilities. Continues comprehensive corrective and preventive maintenance program for waste management systems and facilities. Initiates design of percolation pond

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III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Continuity of Operations (cont'd)			upgrade and remote inspection capabilities for the HLW tanks at ICPP.
	Continued engineering support and technical liaison. Continued RCRA compliance activities.	Continue RCRA compliance activities. Continued engineering support and technical liason.	Continues engineering support and technical liaison. Continues RCRA compliance activities.
	Continued tank farm monitoring and surveillance at RL and SR; continued maintenance and operation of analytical laboratory; continued surveillance and maintenance of shutdown and standby facilities; and continued operation of filter test facilities.	Continue tank farm monitoring and surveillance at RL and SR; continue maintenance and operation of analytical laboratory; continue surveillance and maintenance of shutdown and standby facilities; and continue operation of filter test facilities.	Continues tank farm monitoring and surveillance at RL and SR; continues maintenance and operation of analytical laboratory; continues surveillance and maintenance of shutdown and standby facilities; and continues operation of filter test facilities.
	Includes activities directly related to the technical compliance with DOE Orders and Federal and State regulations at the PUREX, N Reactor Plutonium Finishing Plant (PFP), UO_3 Plant, and T Plant Facilities.	Includes activities directly related to the technical compliance with DOE Orders and Federal and State regulations at the PUREX, N Reactor Plutonium Finishing Plant (PFP), UO_3 Plant, and T Plant Facilities.	Includes activities directly related to the technical compliance with DOE Orders and Federal and State regulations at the PUREX, N Reactor Plutonium Finishing Plant (PFP), UO_3 Plant, and T Plant Facilities.
	Supported Savannah River trace radionuclide analysis. Included waste analysis stock and aqueous effluent analysis. Included collection, treatment, storage and disposal of radioactive, hazardous and mixed waste generated as a result of ongoing operations of the Savannah River Laboratory.	Support Savannah River trace radionuclide analysis. Include waste analysis stock and aqueous effluent analysis. Include collection, treatment, storage and disposal of radioactive, hazardous and mixed waste generated as a result of ongoing operations of the Savannah River Laboratory.	Supports Savannah River trace radionuclide analysis. Includes waste analysis stock and aqueous effluent analysis. Includes collection, treatment, storage and disposal of radioactive, hazardous and mixed waste generated as a result of ongoing operations of the Savannah River Laboratory.
Subtotal, Continuity of Operations	$ 201,739	$ 264,368	$ 283,262
Waste Minimization	Developed a waste minimization exchange network for the purpose of educating, training, reviewing, performing waste	Continue prior year activities. Increases site support and process/specific characterization activities,	Implements waste generation avoidance or reduction activities.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Waste Minimization (cont'd)	stream analysis and providing incentives and awards for minimization efforts.	substitute non-hazardous substitutes for hazardous materials.	
Subtotal, Waste Minimization	$ 3,598	$ 4,453	$ 4,034
Waste Isolation Pilot Plant (WIPP)	Maintained existing worker health and safety programs, emergency preparedness training, and response and hazardous materials management program, and QA program. Designed and implemented facility repairs, modifications and improvements.	Continue security program protecting project personnel, facilities and operations in compliance with DOE Orders. Design and implement facility repairs, modifications and improvements. Maintain the surface facility and perform all essential administrative activities as required by DOE Orders.	Provides increased worker health and safety programs, emergency preparedness training, and response and hazardous materials management program and QA program. Designs and implements facility repairs, modifications and improvements. Maintains the surface facility and performs all essential administrative activities to comply with NQA-1 standards, FSAR and DOE Orders; continues operation of mobile NDE/NDA assay equipment and mobile TRUPACT-II container loading.
	Continued studies supporting compliance with RCRA and 40 CFR 191 Subparts A and B.	Continue monitoring of WIPP compliance with all State and Federal agreements, regulations, orders and other documents, including waste emplacement operations that support the experimental program.	Provides full-scale monitoring of radiological levels and samples groundwater; upgrades operating permits; tracks mixed waste within existing RCRA standards; and provides mining of panel 2.
	Funding was obtained for road improvements for transporting TRU waste to WIPP	No activity.	No activity.
	Continued implementing a national emergency response training program for all corridor states to prepare them for TRU waste shipments. Continued to integrate national TRU waste alternatives to avoid	Continue implementation of a national emergency response training program for all corridor states involved in TRU waste shipments. Begin to integrate shipments of waste with generator sites and WIPP.	Continues program as in prior years.

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III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
WIPP (Cont'd)	duplication of efforts at the ten TRU waste generator sites and WIPP. Provided funding to ORNL to perform an environmental assessment and action description memorandum for Waste Handling Pilot Plant. Provided necessary funding to Richland for initiation of field characterization of the stored TRU waste and preperation of the Phase I status report and continued funding support of Waste Receiving and Processing Facility. Continued to provide funding for activities for TRU Waste Facility at Savannah River including studies required for preperation of cost-of-completion budget estimate.	Continue to support the field operation of the mobile TRU waste certification unit.	
	Continued 40 CFR 191 Performance Assessment activities. Continued Experimental Test Program focused on brine inflow, plug and seal activities, backfill, and gas getters. Continued geotechnical studies and initiated geochemical characterization activities focused on nuclide migration in the salt formation related to backfills and getters. Continue studies required by terms of the Consultation and Cooperation Agreement with the State of New Mexico.	Continue 40 CFR 191 Performance Assessment activities, the Experimental Test Program and specific studies required by terms of the Consultation and Cooperation Agreement with the State of New Mexico. Develop, design, implement, and operate gas generation experiments including data gathering and analysis. Continue to support activities to address HAS concerns and demonstrate compliance with EPA standards. Initiate bin-scale radioactive tests.	Continues 40 CFR 191 performance assessment work to meet 1992 program goals. Aggressively evaluates engineering modifications to address disposal room performance. Continues full-scale radioactive tests to address the gas generation issue. Continues bin-scale radioactive tests. Expands detailed laboratory characterization of seal materials for materials performance models. Continues to define disposal room compaction state and effectiveness of the seal system of WIPP. Maintains technical library, implements quality assurance program.

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III. Activity Description: (Row BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
WIPP (Cont'd)			Continues operational supervision of field test activities including R&D safety program.
Subtotal, WIPP	$ 125,027	$ 79,060	$ 112,337
Defense Waste Processing Facility (DWPF)	Continued DWPF project support including operation of 1/10 scale DWPF operating system.	Continue DWPF pre-operational activities at a manpower intensive rate due to cold runs scheduled to begin in fourth quarter FY 1990. Continue operation of the 1/10 scale DWPF operating system. Begin DWPF Saltstone Operations.	Continues DWPF activities at an increased level with cold runs well underway leading to hot startup in FY 1992.
Subtotal, DWPF	$ 127,643	$ 124,097	$ 128,763
Hanford Waste Vitrification Project (HWVP)	Provided operating support to the HWVP project.	Same as prior year activities. Increase supports definitive design activities.	Continues prior year activities. Increase supports start of construction and procurement activities.
Subtotal, HWVP	$ 8,820	$ 16,056	$ 25,000
Treatment	Continued treatment of radioactive, hazardous and mixed wastes through composition at all sites; continued incineration at ID; continued evaporation of tank wastes at RL, OR, and SR.	Continue treatment of radioactive, hazardous and mixed wastes through composition at all sites; continue incineration at ID; continue evaporation of tank wastes at RL, OR, and SR. Complete design and start cold test operations of Corrugated Metal Pipe/Saw Facility at LANL. Continue calcining operations at New Waste Calcining Facility (NWCF). Continue modifications for processing TRU waste at Processing Experimental Pilot Plant (PREPP). Continue low-level and mixed solid waste composition, waste	Continues treatment of radioactive, hazardous and mixed wastes through composition at all sites; continues incineration at ID; continues evaporation of tank wastes at RL, OR, SR. Begins full operation for size reduction at the Corrugated Metal Pipe/Saw Facility at LANL. Initiates maintenance turnaround and HLW evaporator installation. Completes CDR for NOx abatement at ICPP. Continues low-level and mixed solid waste composition, waste stabilization, incineration, and melting at WERF. Completes

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Treatment (Cont'd)		stabilization, incineration, and melting at WERF. Continue process development for remote-handled (RH) TRU sludge in support of Waste Handling Pilot Plant (WHPP) at ORNL. Continue grouting of LLW for placement on ORNL tumulus. Continue engineering and program management support for waste treatment projects. Initiate conceptual design of the Waste Receiving and Processing Facility (WRAP) at RL.	waste system upgrades to minimize effluent releases to White Oak Creek at ORNL. Continues treatment of backlog waste, including reclassified waste in Plant 8 at PAPC. Supports repackaging of drums at the TSCA incinerator at Oak Ridge. Continues modifications and upgrades at B Plant facility and AR Vault to prepare for processing all double-shell tank wastes. Supports reprocessing of contaminated sodium for recycling at PUREX; initiates definitive design and technology to construct the WRAP (Tri-Party Agreement (TPA) Milestone FY 1996.)
	Continued construction of facilities and waste transfer operations for transferring waste from old tanks to sludge processing, in-tank precipitation (ITP) including the cold runs in support of hot startup at SRS. Completed conceptual design and process development activities on the TRU Waste Facility (TWF); continued engineering studies for the Consolidated Incinerator Facility (CIF).	Provide for completion of ITP construction activities at SRS. Begin salt removal from minimum essential tanks to support ITP and canyon operations.	Continues prior year activities.
	Supported Richland treatment and stabilization of N Reactor effluent stream. Supported operation of the F/H Effluent Treatment Facility (ETF) at SRS.	Continue prior year activities, including hazardous waste control. Support treatment of solid wastes from the Plutonium Finishing Plant (PFP). Support operation of the F/H Effluent Treatment Facility (ETF).	Continues prior year activities. Continues PFP waste treatment; including T Plant upgrades.
	No activity.	No activity.	Assumes operation of PUREX in support of waste management

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Treatment (Cont'd)			activities in the fourth quarter FY 1991. Supports waste operations by providing an effective method to cleanout fuel from storage basins prior to being decommissioned. Assesses full scope and future activities of PUREX as a waste management support facility.
Subtotal, Treatment	$ 121,474	$ 162,188	$ 246,657
Storage	Continued operation and maintenance of facilities for TRU waste storage at all sites.	Continue storage operations for radioactive, hazardous and mixed wastes at all sites, as applicable. Continue operation of Mixed Waste storage facilities; and operation and maintenance of certified and non-certified TRU storage facilities at LANL. Expand mixed and certified contact-handled (CH) TRU storage capacity and provide storage for certified RH-TRU canisters.	Continues prior year activities.
	Continued to operate, maintain and upgrade WWCF tank farm and calcine storage bins for HLW at ID. Continued RL and SR tank farm operations to receive and store waste; continued storage of cesium and strontium capsules in Waste Encapsulation Storage Facility (WESF) at RL; conducted pilot scale engineering studies for design of Double-Shell Tank (DST) upgrades at RL.	Continue tank farm and calcine storage facilities operations. Maintain Transuranic Storage Area (TSA) roads and TSA and Intermediate-Level Transuranic Storage Facility (ILTSF) pads. Provide project management research and development and safety analysis for development of storage facility at Radioactive Waste Management Complex (RWMC). Proceed with removal capability for stored waste, including efforts associated with retrieval containment facility and retrieval of older packages. Initiate Conceptual Design Report (CDR) for Idaho Chemical Processing Plant (ICPP) HLW	Continues prior year activities.

III. Activity Description: (Now BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Storage (Cont'd)		tank farm upgrade. Continue receipt and storage of TRU waste. Continue storage of mixed waste received from the Rocky Flats Plant.	
Subtotal, Storage	$ 85,637	$ 81,152	$ 103,761
Disposal	Continued LLW disposal operations at LANL Area G. Initiated closure plan for BNL radioactive waste landfill at LANL. Continued disposal of LLW at the ID RWMC.	Continue LLW disposal operations at LANL, ID, NV, OR, RL, and SR.	Continues prior year activities.
	Continued development of improved methods of LLW disposal for more efficient space utilization, compliance with environmental regulations, implementation of safety and GA recommendations, and reduction of costs.	Continue development of improved methods of LLW disposal for more efficient space utilization, compliance with environmental regulations, implementation of safety and GA recommendations, and reduction of costs.	Continues prior year activities.
	Continued preparations for mixed waste disposal at Nevada Test Site (NTS). Began composition of low-level waste. Continued disposal of low-level waste. Continued disposal of debris from atmospheric tests. Continued revegetation of old disposal and storage sites.	Continue preparations for mixed waste disposal at NTS.	Begins disposal of mixed waste received from the Rocky Flats Plant at NTS.
	Performed Low-Level Waste Disposal, Development and Demonstration (LLWDDD) program site-specific demonstrations at OR; began National Environmental Policy Act (NEPA) requirements for new disposal facilities; defined functional requirements for new disposal facility including waste stream characterization and capacity and performance requirements;	Continue planning implementation, and demonstrations in support of LLWDDD at OR.	Supports operational start-up costs associated with Interim Waste Management Facility at ORNL.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Disposal (Cont'd)	continued tumulus monitoring.		
	Continued processing and shipment of backlog waste inventory at FMPC, including mixed waste oil and solvents from FMPC and RMI; increased offsite shipments.	Continue shipment of FMPC backlog waste inventory, from FMPC and RMI.	Continues shipment of backlog, including reclassified waste offsite. Continues shipment of construction rubble and stored mixed waste oil and solvents from FMPC. Continues waste shipments from RMI.
	Continued near surface disposal of low-level solid waste by shallow land burial; began grouting of low-level liquid waste to solidify and dispose in constructed near-surface vaults at RL.	Continue disposal of low-level liquid waste as solidified grout in constructed near-surface vaults at RL. Provide engineering support at RL to plans that will discontinue the disposal of contaminated effluents to the soil column.	Continues disposal of LLW at RL as a solidified grout in near-surface vaults that are constructed to meet RCRA requirements. Continues activities that support the plans to discontinue the disposal of contaminated effluents to the soil column at RL.
	Provided for the disposal of radioactive and hazardous wastes at SRS, including the operation of the current LLW burial ground, (including the greater confinement trenches and boreholes). Initiated construction of new LLW storage/disposal facilities for LLW in new burial ground. Initiated engineering/design and operational support of the HW/MW Disposal Facility. Continued DWPF saltstone facilities operation.	Continue engineering, field and operational support of HW/MW Disposal Facility at SRS.	Provides for burial ground operation, including the LLW vaults at SRS. Completes preparation for operation of the HW/MW Disposal Facility at SRS by the fourth quarter FY 1991. Provides for construction of saltstone vault and operating materials for the Waste Certification Facility (WCF) at SRS.
Subtotal, Disposal	$ 81,775	$ 116,355	$ 167,603

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
West Valley Demonstration Project (WVDP)			
· High-Level Waste (HLW) Solidification	Completed design of the Sludge Mobilization System (SMS) and continued equipment installation. Completed design of the mechanical and electrical systems of the vitrification facility. Continued fabrication and construction of systems and components for the vitrification facility, including process systems, jumpers and remote equipment. Began construction of the vitrification facility structure and fabricated shield wall modules.	Initiate construction of the SMS pits and trenches. Continue vitrification testing and waste qualification. Complete construction of vitrification facility structure. Fabricate and install shield wall modules; and procure off-gas equipment and jumpers.	Conducts activities at a level to support start of HLW vitrification in October 1993 with a Phase I TPCE of $890 million (DOE share $801 million). Completes fabrication of jumpers and off-gas equipment, and waste qualification efforts. Continues construction of the SMS. Begins washing sludge. Initiates fabrication of electrical and mechanical systems.
· Decontamination and Decommissioning (D&D)	Funding originally budgeted for D&D activities redirected to higher priority project activities.	No activity.	No activity.
· Site Operations	Continued site operations consistent with project scope and schedule. Supported operations of the Integrated Radwaste Treatment System (IRTS) that is processing the liquid high-level waste. Continued site environmental monitoring and documentation. Continued preparation of the Environmental Impact Statement (EIS) for Phase II of the Project.	Continue support of site operations consistent with project schedule and construction activity. Support operations of the IRTS. Continue hazardous waste management programs site environmental monitoring and documentation. Continue preparation of the EIS for Phase II of the Project.	Continues site operations consistent with project schedule. Supports operations of the IRTS. Continues hazardous waste management programs site environmental monitoring and documentation. Continues preparation of the EIS for Phase II of the Project.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
· Project Support	Continued activities consistent with project scope and schedule. Includes administrative support, quality assurance, analytical laboratory and radiological safety support of the IRTS. Upgraded the analytical laboratory ventilation system.	Continue activities consistent with project scope and schedule. Support project engineering, administrative tasks, quality assurance, and analytical laboratory and radiological safety support of the IRTS.	Continues project management activities consistent with project scope and schedule. Includes administrative support, quality assurance, and analytical laboratory and radiological safety support of the IRTS.
· Low-Level, Hazardous and Transuranic Waste Management	Continued management of radioactive, hazardous and radioactive mixed waste. Continued processing of supernatant in the Supernatant Treatment System (STS), the Liquid Waste Treatment System (LWTS), and the Cement Solidification System (CSS). Continued intermittent operation of the supercompactor and the contact-handled Size Reduction Facility needed to properly section and package contaminated equipment for temporary storage at the site.	Continue management of radioactive, hazardous and mixed waste. Continue processing of supernatant in the STS, LWTS and CSS. Continue intermittent operation of the supercompactor and the contact handled Size Reduction Facility.	Continues management of radioactive, hazardous and mixed waste. Complete processing of supernatant in the STS, LWTS and the CSS (4/91). Begin preparation for sludge washing and processing. Continues operation of the contact-handled Size Reduction Facility and the supercompactor.
Subtotal, WMDP	$ 66,500	$ 87,360	$ 90,000
Low-Level Waste			
· Provide Assistance to States and Compacts	Continued assistance to States and compacts in the areas of: o site development planning o evaluation of alternative disposal technologies o site characterization requirements o license preparation and review o performance assessment o evaluation of waste treatment technologies o quality assurance	Continue assistance to States and compacts in the areas of: o site development planning o evaluation of alternative disposal technologies o site characterization requirements o license preparation and review o performance assessment o evaluation of waste treatment technologies o quality assurance	Continues assistance to States and compacts in the areas of: o site development planning o evaluation of alternative disposal technologies o site characterization requirements o license preparation and review o performance assessment o evaluation of waste treatment technologies o quality assurance

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
· Provide Assistance to States and Compacts (Cont'd)	o national LLW data management system	o national LLW data management system o Interregional coordination	o national LLW data management system o Interregional coordination
· Conduct mandated administrative and reporting responsibilities	o Submitted annual progress report to Congress on LLW activities in the U.S. o Continued escrow account management and prepared guidelines for evaluating eligibility for surcharge rebates for 1990 milestone o Submitted annual rebate expenditure report to Congress o Continued unusual utility volume disposal allocation program	o Disburse escrow account funds to States and compacts consistent with the 1990 milestone o Submit annual progress report to Congress on LLW activities in the U.S. o Continue escrow account management and prepare guidelines for evaluating eligibility for surcharge rebates for 1990 milestone o Submit annual rebate expenditure report to Congress o Continue unusual utility volume disposal allocation program	o Submits annual progress report to Congress o Continues escrow account management o Submits the annual rebate expenditure report to Congress o Continues unusual utility volume disposal allocation program
· Provide for management and disposal of greater-than-class C low-level waste	o Compiled information relevant to waste inventories, projections, and options for management and disposal	o Develop strategic plan for addressing program objectives o Identify facility for interim storage of waste o Develop waste acceptance criteria o Begin interim storage operations o Begin analysis of disposal options o Conduct external peer review of waste volumes and projections analysis	o Continues interim storage of waste o Identifies facility for dedicated storage of waste pending disposal o Designs facility modifications needed for dedicated storage of waste o Completes disposal options report and select preferred disposal option
Subtotal, Low-Level Waste	$ 5,000	$ 4,812	$ 11,500

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Waste Technology			
· Radioluminescent Light Development	Developed promising experimental solid state tritium light source concepts; implemented taxiway lighting demonstration in Florida; continued airfield lighting demonstration in Alaska; initiated technology transfer activities to improve safety and proliferation resistence of commercial radioluminescent light sources.	Successful solid state materials have been produced and applications prototypes will be developed during FY 1990. Testing of airport lighting in cooperation with FAA will take place at Ft. Lewis, WA. A conference will be held to begin transfer of new technology to industry. Demonstration of lighting systems in Alaska and Florida are continuing under direct supervision of State agencies with support from DOE laboratories.	If Congress provides no further direction, this program will be closed out. Some residual activity may continue with funding from outside sources. Management will be transitioned to laboratories.
Subtotal, Waste Technology	$ 564	$ 532	$ 0
Program Support	Provided for support contracts, university grants and support services, and program technical reviews to Headquarters program staff.	Provide for support contracts, the Integrated Data Base on waste inventories, university grants and support services to Headquarters program staff. The increase is to provide for special studies, such as alternate storage sites for Rocky Flats TRU waste, compliance with RCRA Land Disposal Restrictions (LDR), technical assistance for DOE Order 5820.2A implementation, and recovery of cesium capsules.	Provides for support contracts, university grants, and anticipated actions to comply with final third of LDR, WIPP related activities, disposition of offsite waste, and recovery of cesium capsules.
Subtotal, Program Support	$ 13,812	$ 79,628	$ 92,900
Total, Waste Management	$ 841,591	$1,020,091	$1,265,717

990

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Waste Management (Capital Equipment)

The FY 1991 capital equipment request provides critical base programmatic equipment for all Waste Management activities. The requested funding supports the continuation of equipment upgrades and replacement items that are important to the safety and reliability of continued waste operations at DOE sites. These equipment needs consist of items with a life span of several years for which rental or lease costs exceed the purchase price and the replacement of existing deteriorated and obsolete items. Failure of existing equipment is frequent and maintenance costs in conjunction with the attendant radiation exposure to maintenance personnel are not acceptable. In many instances, parts are no longer available and equipment replacement is more cost-effective than repair.

II. A. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Waste Management	$ 51,012	$ 45,093	$ 82,805	+84

II.B. Major Laboratory and Facility Funding:

Argonne National Laboratory	$ 264	$ 14	$ 344	+1,457
Idaho National Engineering Laboratory	1,907	2,823	8,657	+207
Lawrence Livermore National Laboratory	460	827	825	0
Los Alamos National Laboratory	4,842	1,314	1,695	+29
Oak Ridge National Laboratory	245	675	839	+24
Rocky Flats Plant	5,968	6,640	5,424	-18
Sandia National Laboratories	495	185	245	+32
Westinghouse Hanford Company	8,726	6,924	21,862	+216
Westinghouse Savannah River	8,423	17,242	29,900	+73
Westinghouse (WIPP)	17,336	3,715	7,761	+109

III. Activity Description: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Waste Management	Provided equipment to assure the safety and reliability of waste management activities at AL, CH, RL, ID, NV, OR, PNPC, SAN, and SR. Supported purchase of a real-time radiography unit to examine waste at Nevada. Completed fabrication and assembly of 30 TRUPACTs (60%). Continued fabrication and assembly of remaining 21 TRUPACTs. Provided essential equipment for underground waste emplacement operations and safety at the Waste Isolation Pilot Plant (WIPP). Provided for continued equipment procurement needed to support grout operations at Richland and partial funding to initiate the purchase of third melter for the Defense Waste Processing Facility (DWPF). Supported conversion of B-Plant to operating status. Provided equipment necessary to support Weapons and Nuclear Materials Production.	Provide equipment to assure the safety and reliability of waste management activities at AL, RL, ID, NV, OR, PNPC, and SR. Complete fabrication and assembly of remaining 21 TRUPACTs; provide partial funding to continue procurementof third melter for DWPF. Provide equipment necessary to support Weapons and Nuclear Materials Production.	Provides equipment to assure the safety and reliability of waste management activities at AL, RL, ID, NV, OR, PNPC, and SR. Continues procurement of melter at SR. Increase provides required process operas for the Savannah River DWPF vitrification operations. Provides equipment necessary for waste management operations at Weapons and Nuclear Materials Production facilities. Increase provides excavation, assay, and sorting equipment for retrieval and processing of uncertified TRU waste; laboratory equipment to support the volume and quality requirements for RCRA analyses; treatment equipment for groundwater well purge water; and instrumentation and control systems for processing cells in the B Plant tank waste pretreatment facility at Richland.
	$ 51,012	$ 45,093	$ 82,805

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Waste Management (Construction)

Construction project funding is necessary to maintain the health, safety and continuity of waste operations and continue environmental-related projects that correct and clean up environmental hazards. These environmental projects are to bring DOE facilities within compliance of current environmental laws such as the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Clean Water Act, and relevant Environmental Protection Agency and DOE-imposed regulations.

II.A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Appropriation	FY1991 Request	% Change
Waste Management	$ 202,676	$ 182,519	$ 303,790	+66

IV. A. Construction Project Summary

Waste Management

Project Number	Project Title	FY 1989 Appropriation	FY 1990 Appropriation	FY 1991 Request	Unappropriated Balance	TEC
GPP-171	General Plant Projects, VL	$ 25,731	$ 30,193	$ 44,721	$ 0	$ 44,721
91-D-125	Environment, Safety and Health, Phase III, Mound	0	0	284	<----Split Funded---->	
91-D-171	Waste Receiving and Processing Facility, Module 1, RL	0	0	2,700	49,300	52,000
91-D-172	High-Level Waste Tank Farm Upgrade, Idaho Chemical Processing Plant (ICPP), INEL	0	0	13,000	257,000	270,000
91-D-173	Hazardous Low-Level Waste Processing Tanks, SR	0	0	5,800	43,700	49,500
91-E-305	Waste Minimization Facilities Upgrade, BWL	0	0	500	1,400	1,900
91-E-306	Hazardous Waste Treatment Facility, PNL	0	0	970	3,030	4,000
91-E-322	329 Building Compliance, PNL	0	0	1,800	5,500	7,300
90-D-103	ES&H Improvements, AL	0	2,069	0	N/A	N/A
90-D-126	ES&H Enhancements, AL	0	2,137	0	N/A	N/A
90-D-171	Laboratory Ventilation and Electrical System Upgrade, RL	0	1,084	4,100	1,116	6,300
90-D-172	Aging Waste Transfer Lines, RF	0	1,281	4,000	7,219	12,500
90-D-173	B-Plant Canyon Crane Replacement, RL	0	1,478	4,300	6,822	12,600
90-D-174	Decontamination Laundry Facility, RL	0	2,758	9,900	4,142	16,800
90-D-175	Landlord Program Safety Compliance-I, RL	0	453	2,640	<----Split Funded---->	
90-D-176	Transuranic (TRU) Waste Facility, SR	0	3,054	15,300	54,646	73,000
90-D-177	RAHC TRU Waste Treatment and Storage Facility INEL	0	4,925	26,000	101,075	132,000
90-D-178	TSA Retrieval Containment Building, INEL	0	5,910	11,100	90	17,100
89-D-122	Production Waste Storage Facility, Y-12, OR	2,000	9,062	5,500	8,438	25,000
89-D-141	M Area Waste Disposal, SR	3,600	7,683	7,500	3,917	22,700
89-D-172	Hanford Environmental Compliance, RL	4,100	19,011	35,660	N/A	N/A
89-D-173	Tank Farm Ventilation Upgrade, RL	1,800	15,169	3,600	4,231	24,600
89-D-174	Replacement High-Level Waste Evaporator, SR	3,520	9,220	11,330	19,930	44,000
89-D-175	Hazardous Waste/Mixed Waste Disposal Facility, SR	3,500	6,343	7,600	2,057	19,500
89-E-111	Multiprogram Technical Support Center, PNL, RL	600	2,169	200	31	3,000
89-E-112	Replace PCB Transformers, CH	25	883	0	N/A	N/A
88-D-173	Hanford Waste Vitrification Plant (HWVP), RL	22,500	28,664	75,500	830,836	965,000
88-E-812	Hazardous Waste Handling Facility, SAN	2,855	1,331	0	N/A	N/A
87-D-159	ES&H Improvements, FMPC, OR	0	5,154	4,985	N/A	N/A
87-D-173	Treatment Operations, RL	1,944	690	0	N/A	N/A
87-D-180	Burial Ground Expansion, SR	2,068	0	0	N/A	N/A
87-D-181	Diversion Box and Pump Containment Building, SR	6,371	2,748	0	N/A	N/A
86-D-103	Decontamination and Waste Treatment Facility, SAN	12,000	5,122	0	N/A	N/A
83-D-148	Non-Radioactive Hazardous Waste Management, SR	13,000	13,928	5,000	4,712	56,000
	Prior Year Projects	97,062	0	0	N/A	N/A
	Subtotal, Waste Management	$ 202,676	$ 182,519	$ 303,790		
Operating Expenses						
	West Valley Demonstration Project, West Valley, NY	$ 66,500	$ 87,360	$ 90,000	$ 345,358	$ 890,000

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 91-GPD-171, General Plant Projects, Various Locations

PROJECT TEC: $44,721
START DATE: 1st Qtr. FY 1991
COMPLETION DATE: 4th Qtr. FY 1991

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1989	$ 25,731	$ 25,731	$ 23,158
1990	30,193	30,193	27,174
1991	44,721	44,721	41,000

3. Narrative:

These projects provide various items of new construction, additions, alterations, and improvements to the lands, buildings, and utility systems at the Richland, and Idaho offices to support program needs in health, safety, and environment, general support, and other program requirements. Some of the projects may be located on non-Government land.

The FY 1991 funding will be used for design, procurement, and construction activities.

4. Total Project Funding (B/O):

Not applicable.

995

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 91-D-125, Environmental, Safety, and Health, Phase III
Mound Plant, Miamisburg, Ohio

PROJECT TEC: $ 3,800 g/
START DATE: 2nd Qtr. FY 1991
COMPLETION DATE: 4th Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 284 g/	$ 284	$ 255
1992	566	566	510
1993	0	0	85

3. Narrative:

The mission of this project is to ensure that Mound's activities are in compliance with all Federal, state, and local regulations. This project is a third major part of an overall program under DOE Environmental, Safety, and Health guidance to the various sites. This project is a follow-on to the Project 89-D-126, Environmental, Safety, and Health Upgrade, Phase II. The project consists of three subprojects.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 255	$ 595
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

966

g/ Funding request is for Waste Management activities only. A separate data sheet is being submitted for the Weapons Activities portion of this project.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 91-D-171, Waste Receiving and Processing Facility, Module 1, Richland, Washington

PROJECT TEC: $ 52,000
START DATE: 2nd Qtr. FY 1991
COMPLETION DATE: 3rd Qtr. FY 1995

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 2,700	$ 2,700	$ 2,050
1992	7,400	7,400	5,410
1993	28,800	28,800	24,540
1994	13,100	13,100	19,240
1995	0	0	760

3. Narrative:

The Waste Receiving and Processing Module 1 facility will provide treatment for all newly generated and retrieved solid wastes prior to disposal to meet requirements of Resource Conservation and Recovery Act (RCRA), Washington Administrative Code 173-303, and DOE Order 5820.2A Radioactive Waste Management.

The FY 1991 funding will be used to initiate definitive design, long-lead procurements, and project management support.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 2,050	$ 49,950
Capital Equipment	0	0	0	0	0
Operating Expenses	3,200	0	0	200	3,800

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 91-D-172, High-level Waste Tank Farm Replacement, Idaho Chemical Processing Plant (ICPP), INEL, Idaho

PROJECT TEC: $270,000 a/
START DATE: 1st Qtr. FY 1991
COMPLETION DATE: 4th Qtr. FY 1998

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 13,000	$ 13,000	$ 12,000
1992	60,000	60,000	50,000
1993	79,000	79,000	75,000
1994	79,000	79,000	75,000
1995	29,000	29,000	45,000
1996	10,000	10,000	8,000
1997	0	0	3,000
1998	0	0	2,000

3. Narrative:

This project provides for construction of four new 500,000-gallon capacity high-level radioactive waste storage tanks, plus upgrading of auxiliary systems and transfer lines for existing underground storage tanks. The new tanks will be designed and built to meet the Resource Conservation and Recovery Act (RCRA) regulations for hazardous waste tank systems, as well as applicable seismic and operational requirements.

The FY 1991 funding will be used to begin definitive design and long-lead procurements.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 12,000	$258,000
Capital Equipment	0	0	0	0	TBD
Operating Expenses	0	380	1,270	0	TBD

a/ Planning estimate only; conceptual design not yet performed.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 91-D-173, Hazardous Low-Level Waste Processing Tanks, Savannah River, South Carolina

PROJECT TEC: $ 49,500
START DATE: 2nd Qtr. FY 1991
COMPLETION DATE: 3rd Qtr. FY 1995

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 5,800	$ 5,800	$ 4,400
1992	10,100	10,100	9,200
1993	12,300	12,300	11,300
1994	14,800	14,800	15,600
1995	6,500	6,500	9,000

3. Narrative:

This project will provide a facility in H-Area at the Savannah River Site (SRS) to receive and transfer hazardous low-level liquid waste streams generated by Extended Sludge Processing (ESP), the Effluent Treatment Facility (ETF), In-Tank Precipitation (ITP), and the Receiving Basin for Offsite Fuels (RBOF). This facility will manage approximately 6 million gallons of hazardous low-level waste annually. This waste will be distributed to salt and sludge removal facilities, Saltstone, the Tank 32 cesium removal column (CRC), and In-Tank Precipitation.

4. Total Project Funding (B/O):

	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 5,800	$ 43,700
Capital Equipment	0	0	0	0
Operating Expenses	0	0	0	0

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 91-E-305, Waste Minimization Facility,
Brookhaven National Laboratory, Upton, New York

PROJECT TEC: $ 1,900
START DATE: FY 1991
COMPLETION DATE: FY 1992

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 500	$ 500	$ 450
1992	1,400	1,400	1,450

3. Narrative:

(a) This project will support a comprehensive effort to modify existing radioactive waste minimization facilities and provide additional facility support in the area of radioactive waste reduction.

(b) Modifications are required to function in accordance with safety requirements and to achieve minimization of radioactive waste disposal and its associated cost.

(c) $500,000 is requested in FY 1991 to conduct architectural/engineering efforts and to initiate construction.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 450	$ 1,450
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 91-E-306, Hazardous Waste Treatment Facility,
Pacific Northwest Laboratory, Richland, Washington

PROJECT TEC: $ 4,000
START DATE: FY 1991
COMPLETION DATE: FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 970	$ 970	$ 460
1992	3,030	3,030	2,110
1993	0	0	1,430

3. Narrative:

(a) This project will provide a new treatment facility in which regulated, nonradioactive chemical wastes can be detoxified or converted to a less hazardous form.

(b) This project will provide a new facility in which regulated, nonradioactive, hazardous wastes can be detoxified, solidified, and/or converted to a less hazardous form which can, in turn, be packaged and shipped as a nonhazardous waste for disposal in a cost effective, compliant manner.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 460	$ 3,540
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 91-E-322, 329 Building Compliance,
Pacific Northwest Laboratory, Richland, Washington

PROJECT TEC: $ 7,300
START DATE: FY 1991
COMPLETION DATE: FY 1994

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 1,800	$ 1,800	$ 1,070
1992	3,400	3,400	3,320
1993	2,100	2,100	2,490
1994	0	0	420

3. Narrative:

(a) This project will renovate major building systems to improve ventilation, air filtration and waste water piping to control radionuclides and ensure safe liquid effluents.

(b) These renovations are necessary to comply with the Clean Air Act, Clean Water Act, RCRA, and other requirements.

(c) $1,800,000 is requested for FY 1991 to allow for architectural/engineering efforts and preliminary construction.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 1,070	$ 6,230
Capital Equipment	0	0	0	0	0
Operating Expenses	0	120	0	0	0

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 90-D-171, Laboratory Ventilation and Electrical System Upgrade, Richland, Washington

PROJECT TEC: $ 6,300
START DATE: 2nd Qtr. FY 1990
COMPLETION DATE: 2nd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 1,084	$ 1,084	$ 570
1991	4,100	4,100	2,890
1992	1,116	1,116	2,210
1993	0	0	630

3. Narrative:

This project will upgrade the ventilation and electrical systems of 222-S analytical laboratory to ensure compliance with DOE safety requirements.

FY 1991 funding initiates construction activities associated with ventilation and electrical systems in the analytical laboratory.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 570	$ 2,890	$ 2,840
Capital Equipment	0	0	0	0	0
Operating Expenses	0	393	10	10	40

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DEPARTMENT OF ENERGY
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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 90-D-172, Aging Waste Transfer Lines,
Richland, Washington

PROJECT TEC: $ 12,500
START DATE: 1st Qtr. FY 1992
COMPLETION DATE: 3rd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 1,281	$ 1,281	$ 950
1991	4,000	4,000	1,010
1992	6,000	6,000	6,690
1993	1,219	1,219	3,790
1994	0	0	60

3. Narrative:

This project will provide a new, reliable, long-term, high-heat waste transfer system to support waste pretreatment at B-Plant and future waste disposal treatment at the Hanford Waste Vitrification Plant (HWVP).

The new high-heat waste transfer system will consist of encased pipelines (16,500 LF) which connects B-Plant and HWVP to the high-heat waste tank farms. New diversion boxes for waste transfer flexibility, instrumentation, and auxiliary equipment for monitoring and leak detection for waste transfers will also be provided.

The existing pipelines between B-Plant and the waste tanks were installed in 1952 and are ready for decommissioning.

The FY 1991 funding will initiate construction of the waste transfer system.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 950	$ 1,010	$ 10,540
Capital Equipment	0	0	0	0	0
Operating Expenses	0	382	60	60	150

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DEPARTMENT OF ENERGY
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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 90-D-173, B-Plant Canyon Crane Replacement, Richland, Washington

PROJECT TEC: $ 12,600
START DATE: 2nd Qtr. FY 1991
COMPLETION DATE: 3rd Qtr. FY 1994

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 1,478	$ 1,478	$ 730
1991	4,300	4,300	2,540
1992	5,800	5,800	4,030
1993	700	700	2,440
1994	322	322	2,860

3. Narrative:

This project will provide B-Plant with a new remotely controlled bridge crane to replace the existing 49-year old canyon crane. The project also will construct a Crane Maintenance Facility adjoining the canyon building that will provide enhanced canyon crane decontamination and maintenance capability for the plant.

The existing crane is obsolete and unreliable and is inadequate for the new B-Plant mission to provide feed for vitrification and grout. Due to its age, crane replacement parts are virtually unavailable. Also, the existing crane's design does not allow for the use of aqueous decontamination solutions which greatly increases maintenance time and costs.

The FY 1991 funding initiates construction.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 730	$ 2,540	$ 9,330
Capital Equipment	0	0	0	0	0
Operating Expenses	195	0	730	0	250

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DEPARTMENT OF ENERGY
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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 90-D-174, Decontamination Laundry Facility, Richland, Washington

PROJECT TEC: $ 16,800
START DATE: 3rd Qtr. FY 1991
COMPLETION DATE: 1st Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 2,758	$ 2,758	$ 2,600
1991	9,900	9,900	6,300
1992	3,700	3,700	6,900
1993	442	442	1,000

3. Narrative:

This project will provide a new decontamination laundry facility which will ensure safe and efficient processing, monitoring, repair, and storage of all protective clothing used at the Hanford Site.

Existing facilities do not comply with RCRA and other regulatory requirements for waste disposal.

The FY 1991 funding continues design activities, long-lead procurements, and initiates construction.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 2,600	$ 6,300	$ 7,900
Capital Equipment	0	0	0	0	0
Operating Expenses	0	297	20	10	60

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DEPARTMENT OF ENERGY
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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 90-D-175, Landlord Program Safety Compliance-I, Richland, Washington

PROJECT TEC: $ 28,600
START DATE: 1st Qtr. FY 1991
COMPLETION DATE: 4th Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 453	$ 453	$ 410
1991	2,640	2,640	2,376
1992	2,742	2,742	2,461
1993	0	0	588

3. Narrative:

This line item includes four subprojects to eliminate safety deficiencies in Landlord facilities.

Water System -- Two new fire protection reservoirs and associated pumps and piping to meet a DOE Order and National Fire Protection Association (NFPA) standards.

Restored Mainline -- Replace 23 miles of track to complete rehabilitation of the inservice railroad at Hanford.

Firewater Storage and Distribution -- Replace/upgrade electrical systems in the 44-year old system generation facilities (200 Area) to comply with current codes.

Steam System Safety and Productivity -- Replace or upgrade electrical systems in the 44-year old system generation facilities (200 Area) to comply with current codes.

The FY 1991 funding will be used for procurement and construction activities and includes $2,640,000 for Waste Management activities under the Environmental Restoration and Waste Management Five-Year Plan.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 410	$ 2,376	$ 3,049
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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DEPARTMENT OF ENERGY
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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 90-D-178, Transuranic (TRU) Waste Facility,
Savannah River, South Carolina

PROJECT TEC: $ 73,000
START DATE: 3rd Qtr. FY 1992
COMPLETION DATE: 3rd Qtr. FY 1995

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 3,054	$ 3,054	$ 2,700
1991	15,300	15,300	9,600
1992	14,200	14,200	14,100
1993	17,400	17,400	19,000
1994	16,900	16,900	20,000
1995	6,146	6,146	7,600

3. Narrative:

The TRU Waste Facility (TWF), which will be permitted under the Resource Conservation and Recovery Act (RCRA), will consist of a building and necessary equipment to retrieve, examine, repackage, and prepare for certification of TRU waste at the Savannah River Plant so it can be safely shipped to the Waste Isolation Pilot Plant (WIPP) in New Mexico.

Approximately 15,000 cubic feet of stored waste and 6,200 cubic feet of newly generated waste will be handled each year at the TWF. This reduces the risk of continued long-term interim storage of TRU waste at the Savannah River Plant. In addition, RCRA prohibits storage of newly generated mixed TRU waste.

The FY 1991 funding will continue final design activities, prepare specifications for design/construction packages, and complete equipment purchase order requests.

4. Total Project Funding (B/D):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 2,700	$ 9,600	$ 60,700
Capital Equipment	0	0	0	0	0
Operating Expenses	0	9,900	560	60	400

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DEPARTMENT OF ENERGY
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(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 90-D-177, RWMC TRU Waste Treatment and Storage Facility, Idaho National Engineering Laboratory (INEL), Idaho

PROJECT TEC: $152,000
START DATE: 1st Qtr. FY 1990
COMPLETION DATE: 4th Qtr. FY 1994

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 4,925	$ 4,925	$ 4,500
1991	26,000	26,000	21,000
1992	52,000	52,000	40,000
1993	49,075	49,075	55,000
1994	0	0	11,500

3. Narrative:

The Radioactive Waste Management Complex (RWMC) Transuranic (TRU) Waste Treatment and Storage Facility project provides for the design, procurement, and construction of a Resource Conservation and Recovery Act (RCRA) permitted facility at the Idaho National Engineering Laboratory (INEL) that will accept contact-handled (CH) TRU waste for treatment and storage.

The facility consists of a support module, repackaging module, sampling module, and a series of storage modules.

The FY 1991 funding will be used to construct some storage and Work Control and Personnel Support Buildings, and continue detailed design on the Waste Treatment and Repackaging Buildings.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 4,500	$ 21,000	$106,500
Capital Equipment	0	0	0	0	0
Operating Expenses	0	4,000	750	650	9,100

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DEPARTMENT OF ENERGY
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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 90-D-178, TSA Retrieval Containment Building,
Idaho National Engineering Laboratory (INEL), Idaho

PROJECT TEC: $ 17,100
START DATE: 1st Qtr. FY 1990
COMPLETION DATE: 4th Qtr. FY 1991

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1990	$ 5,910	$ 5,910	$ 3,000
1991	11,100	11,100	14,010
1992	90	90	90

3. Narrative:

The Idaho National Engineering Laboratory (INEL) Radioactive Waste Management Complex (RWMC) Transuranic Storage Area (TSA) Retrieval Containment Building project provides for the design, procurement, and construction of a weather-tight enclosure in which the waste presently stacked on TSA pads can be retrieved on a year around basis. The structure would also serve to contain any contamination that could be released from a breached or deteriorated waste package, or from a material handling accident.

The FY 1991 funding completes construction of the enclosure.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 3,000	$ 14,010	$ 90
Capital Equipment	0	0	0	0	0
Operating Expenses	0	1,000	975	1,750	0

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(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 89-D-122, Production Waste Storage Facility, Y-12 Plant, Oak Ridge, Tennessee

PROJECT TEC: $ 25,000
START DATE: 1st Qtr. FY 1989
COMPLETION DATE: 2nd Qtr. FY 1994

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1989	$ 2,000	$ 2,000	$ 1,300
1990	9,062	9,062	1,700
1991	5,500	5,500	9,900
1992	4,900	4,900	8,000
1993	3,538	3,538	3,600
1994	0	0	500

3. Narrative:

This project provides for the engineering design, procurement, and construction of a complex of waste storage facilities designated collectively as the Production Waste Storage Facilities (PWSF). These facilities, to be sited at Y-12 and K-24 (Oak Ridge Gaseous Diffusion Plant), will provide, during the 1992-1996 period, the means for Y-12 to store the wastes generated as by-products of its weapon production operations.

4. Total Project Funding (B/D):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 1,300	$ 1,700	$ 9,900	$ 11,600
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 89-D-141, H Area Waste Disposal,
Savannah River Site, South Carolina

PROJECT TEC: $ 22,700
START DATE: 3rd Qtr. FY 1989
COMPLETION DATE: 2nd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1989	$ 3,600	$ 3,600	$ 1,500
1990	7,683	7,683	6,300
1991	7,500	7,500	9,800
1992	1,200	1,200	2,200
1993	2,717	2,717	2,900

3. Narrative:

This project provides for construction of a facility to treat and dispose of waste generated by the 300-M Fuel Fabrication Facility. This project is necessary to comply with Federal law; i.e., the 1984 Amendment to the Resource Conservation and Recovery Act (RCRA). Under the RCRA Land Disposal Restriction regulations, waste from the 300-M Area cannot be disposed of in its current form after May 1990.

4. Total Project Funding ($/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 1,500	$ 6,300	$ 9,800	$ 5,100
Capital Equipment	0	0	0	0	0
Operating Expenses	2,000	300	100	100	50

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(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 89-D-172, Hanford Environmental Compliance, Richland, Washington

PROJECT TEC: $134,500a/
START DATE: 2nd Qtr. FY 1989
COMPLETION DATE: 4th Qtr. FY 1994

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1989	$ 4,100	$ 4,100	$ 2,600
1990	19,011	19,011	17,330
1991	35,660b/	35,660	35,580
1992	34,200	34,200	35,382
1993	13,300	13,300	14,610
1994	2,217	2,217	2,252
1995	0	0	1,334

3. Narrative:

This line item request represents the capital improvements necessary to achieve compliance with applicable environmental requirements at the Hanford site.

The FY 1991 funding will be used to continue the 9 subprojects begun in FY 1989 and FY 1990, and to initiate three new subprojects listed below:

- o B-Plant Radiological Effluent/Containment Upgrades (TEC $12,000)
- o Environmental Hot Cell Expansion (TEC $13,800)
- o PUREX Liquid Effluent Treatment Facility (TEC $11,200)

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 2,600	$ 17,330	$ 34,230	$ 43,128
Capital Equipment	0	0	0	0	0
Operating Expenses	0	4,504	6,000	4,590	6,070

a/ Total project estimated cost is $180 million. Additional subprojects will be included in the future.
b/ Funding for Waste Operations activities associated with this project only. A separate data sheet will be submitted for the Corrective Activities portion of this project.

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(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 89-D-173, Tank Farm Ventilation Upgrade, Richland, Washington

PROJECT TEC: $ 24,600
START DATE: 2nd Qtr. FY 1990
COMPLETION DATE: 3rd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1989	$ 1,800	$ 1,800	$ 1,620
1990	15,169	15,169	6,750
1991	3,400	3,400	6,750
1992	4,231	4,231	4,590
1993	0	0	2,960
1994	0	0	1,930

3. Narrative:

This project will provide upgrades to the essential control systems of the AY and AZ Tank Farms, to support the safe and efficient storage for radioactive high heat liquid waste. Upgrades and improvements will be made to the ventilation and cooling system, the electrical standby power, and the instrument/control system.

The FY 1991 funding will be used to continue definitive design, long-lead procurements, and bid award the fixed-price construction contract.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 1,620	$ 6,750	$ 6,750	$ 9,480
Capital Equipment	0	0	0	0	0
Operating Expenses	1,165	775	250	250	800

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(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 89-D-174, Replacement High-Level Waste Evaporator, Savannah River, South Carolina

PROJECT TEC: $ 44,000
START DATE: 2nd Qtr. FY 1990
COMPLETION DATE: 2nd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1989	$ 3,520	$ 3,520	$ 1,300
1990	9,220	9,220	6,935
1991	11,330	11,330	11,890
1992	15,920	15,920	18,340
1993	4,010	4,010	5,535

3. Narrative:

The Replacement High-Level Waste Evaporator will provide the cost-effective waste concentration facility necessary to continue materials production and waste solidification programs at the Savannah River Site. The proposed facility is capable of removing 7.6 million gallons of water each year from the waste complex. Along with two other existing evaporators, it will be able to handle the additional volume of waste generated by the Defense Waste Processing Facility and associated waste tank farm processes, plus the byproduct waste of materials production facilities.

The FY 1991 funding will be used to continue design, procurement, and construction activities.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 1,300	$ 6,935	$ 11,890	$ 23,875
Capital Equipment	0	0	0	0	0
Operating Expenses	1,480	250	0	0	250

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(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 89-D-175, Hazardous Waste/Mixed Waste Disposal Facility, Savannah River, South Carolina

PROJECT TEC: $ 19,500 a/
START DATE: 4th Qtr. FY 1990
COMPLETION DATE: 2nd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1989	$ 3,500	$ 3,500	$ 2,400
1990	6,343	6,343	5,800
1991	7,600	7,600	5,500
1992	2,057	2,057	4,000
1993	0	0	1,800

3. Narrative:

This project will provide a 14-acre developed site for the above-ground disposal of hazardous and mixed waste per the South Carolina Department of Health and Environmental Control, the Federal Environmental Protection Agency, and the Department of Energy regulations.

No other planned facilities (on- or offsite) are currently scoped to dispose of solid hazardous and mixed wastes. The project will provide land area to dispose of 20 years of waste based on an annual generation rate of 40,000 cubic feet. The project will also provide six initial disposal units to dispose of the existing inventory at startup (340,000 cubic feet) plus an additional three years of generation.

The FY 1991 funding will be used for continuation of construction activities.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 2,400	$ 5,800	$ 5,500	$ 5,800
Capital Equipment	0	0	0	0	0
Operating Expenses	615	400	350	300	0

a/ Project TEC, funding profile, and schedule are under review and may increase. The Congress will be fully informed of any changes when they occur.

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 89-R-111, Multiprogram Technical Support Center,
Pacific Northwest Laboratory, Richland, Washington

PROJECT TEC: $ 3,000
START DATE: FY 1989
COMPLETION DATE: FY 1991

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1989	$ 600	$ 600	$ 600
1990	2,169	2,169	2,169
1991	200	200	200
1992	31	31	31

3. Narrative:

This project provides for renovations to existing multiprogram laboratory facilities to correct deficiencies of miscellaneous multiprogram facilities systems, while meeting current standards of health, safety, security, and energy conservation and, at the same time, extending the useful life of the buildings.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 600	$ 2,169	$ 200	$ 31
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 88-D-173, Hanford Waste Vitrification Plant (HWVP), Richland, Washington

PROJECT TEC: $960,000 a/
START DATE: 4th Qtr. FY 1991
COMPLETION DATE: 3rd Qtr. FY 1998

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1988	$ 7,500	$ 7,500	$ 6,766
1989	22,500	22,500	21,434
1990	28,664	28,664	27,500
1991	75,500	75,500	68,800
1992	107,200	107,200	70,700
1993	118,900	118,900	105,700
1994	200,200	200,200	203,400
1995	180,600	180,600	199,200
1996	129,700	129,700	160,900
1997	63,700	63,700	65,500
1998	18,500	18,500	29,800
1999	9,600	9,600	10,600
2000	2,436	2,436	2,900

3. Narrative:

The HWVP facility houses vitrification process equipment and support services for immobilizing Hanford Defense liquid high-level waste (HLW).

FY 1991 funds will be utilized for the continuation of definitive design, the start of construction and procurement activities, the start of field engineering and inspection, and the continuation of project related activities.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 6,766	$ 21,434	$ 27,500	$ 68,800	$840,500
Capital Equipment	0	0	0	3,305	18,475
Operating Expenses	44,679	9,165	16,300	25,000	333,370

a/ Cost estimate is based on completed Reference Conceptual Design. The Title I (Preliminary) design cost estimate will be completed in April 1990. An increase in the TEC not exceeding 15 percent is projected.

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 87-D-159, Environmental, Health, and Safety Improvements, Phases I, II, III, IV, and V, Feed Materials Production Center, Fernald, Ohio

PROJECT TEC: $10,217 a/
START DATE: 2nd Qtr. FY 1987
COMPLETION DATE: 4th Qtr. FY 1994

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1987	$ 0	$ 0	$ 0
1988	0	0	0
1989	0	0	0
1990	5,154	5,154	4,700
1991	4,985	4,985	4,490
1992	78	78	1,027
1993	0	0	0
1994	0	0	0

3. Narrative:

This project provides a series of improvements that will reduce hazardous discharges from the Feed Materials Production Center (FMPC) and ensure that plant operations do not pose a threat to the environment, the community, or the work force. This multi-phase improvements project will assure the environmentally safe operation of FMPC to produce depleted and slightly enriched uranium metals for the nuclear materials production reactors. Major improvements are planned for air quality control systems, water quality control systems, improvements to contamination control, reduction of radiation exposure to workers and enhancement of alarm and warning systems.

FY 1991 funds will be used for design, procurement, and construction activities.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 4,700	$ 4,490	$ 1,027
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

a/ Funding request for Waste Management Activities associated with this line item only. Separate data sheets are being submitted reflecting funding profiles for Nuclear Materials Production and Environmental Restoration portions of this project.

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Plant Funded Construction Project

1. Project 83-D-148, Non-Radioactive Hazardous Waste Management, Savannah River Site, South Carolina

PROJECT TEC: $ 56,000 a/
START DATE: 4th Qtr. FY 1984
COMPLETION DATE: 3rd Qtr. FY 1992 a/

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1983	$ 1,000	$ 1,000	$ 0
1984	3,000	3,000	178
1985	9,500	9,500	1,427
1986	1,660	1,660	4,036
1987	0	0	1,894
1988	4,200	4,200	3,946
1989	13,000	13,000	8,769
1990	13,928	13,928	19,180
1991	5,000	5,000	10,780
1992	4,712	4,712	5,790

3. Narrative:

This project will provide facilities to treat and dispose of hazardous waste generated at the Savannah River Plant in accordance with Federal and State regulations, including a Consolidated Incinerator Facility. These wastes are considered hazardous under the Resource Conservation and Recovery Act (RCRA), low-level radioactive wastes, and mixed wastes that are both radioactive and hazardous.

FY 1991 funding will continue construction.

4. Total Project Funding (B/O):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 11,581	$ 8,769	$ 19,180	$ 10,780	$ 5,790
Capital Equipment	0	0	0	0	0
Operating Expenses	5,080	4,380	3,920	3,300	4,500

a/ Project TEC, funding profile, and schedule are under review and may increase. The Congress will be fully informed of any changes when they occur.

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(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

IV. B. Operating Expense Funded Data Sheet

1. Project Title and Location: West Valley Demonstration Project
West Valley, New York

PROJECT TEC: $801,000 (DOE)g/
START DATE: September 1991
COMPLETION DATE: April 1995

2. Financial Schedule:

Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
$ 303,482	$ 66,500	$ 87,360	$ 90,000	$ 253,659

3. Narrative:

Public Law 96-368, West Valley Demonstration Project Act of 1980, directed the Department of Energy to carry out a high-level liquid nuclear waste management demonstration project at the Western New York Nuclear Service Center near West Valley, New York, for the purpose of demonstrating the solidification and preparation of high-level radioactive waste for disposal. By virtue of demonstrating the solidification of liquid high-level wastes (HLW) the hazards associated with continued storage of the liquid waste at the Center will be eliminated.

Specifically, in FY 1991 Phase I (solidification) activities will include completion of processing of the HLW supernatant; continuation of construction of the vitrification facility; continuing sludge mobilization system transfer piping construction; beginning of sludge wash; operation of LLW treatment systems; and necessary program management, industrial health and safety, environmental protection, plant maintenance and operation, security and safeguards, and environmental monitoring and Phase II (post solidification) planning, including continuation of preparing the Phase II Environmental Impact Statement.

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g/ Total project cost will be re-examined to assess the impacts of a FY 1990 reduction as well as the impact of new environmental and safety regulations and health and safety practices resulting from recent assessments.

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KEY ACTIVITY SUMMARY

I. Preface: Technology Development

The primary mission of the Technology Development program is to manage and direct program activities to establish and maintain an aggressive national program for applied research, development, demonstration, testing, and evaluation (RDDT&E). The principle objective of the program is to resolve major technical issues and rapidly advance beyond current technologies for environmental restoration and waste management operations. The program is directed to support activities under the Office of Environmental Restoration and Waste Management.

This program mission supports the Department of Energy's (DOE) 30-year compliance and cleanup goal by:(1) establishing the management process for funding technologies at their various stages of development and deployment for better, faster, and more cost-effective interim and permanent solutions to environmental problems; (2) conducting an innovative, aggressive technology development program for waste management, waste minimization, waste treatment, storage, and disposal; (3) developing more effective remediation technology for restoration of contaminated sites and facilities; (4) developing technologies to reduce occupational and public exposure; (5) establishing a coordinated education program involving universities, DOE national laboratories, and industry to train the people needed to address DOE's Environmental Restoration and Waste Management programs; and (6) promote technology transfer and outreach among the Department, private sector, and other agencies.

The Technology Development program provides the innovative technology, its progressive development, and its demonstration to make available new technology for environmental cleanup and restoration, decontamination and decommissioning, and waste management including minimization and disposal.

During fiscal year 1990, the Applied Research, Development, Demonstration, Testing and Evaluation Plan was prepared by DOE for submission to Congress, the States, and a wide distribution of interested parties to describe the needs for technologies, the current state of technologies and to plan activities to fulfill DOE's objectives to reduce risk to human health and the environment, decrease cost, and achieve a 30-year restoration goal. This plan will appear in the annual updates of the Environmental Restoration and Waste Management Five-Year Plan.

Program Overview

The Technology Development program provides management oversight and review of RDDT&E activities and policy guidance, oversight of university programs, and pursues innovative technologies through university, industry, and interagency cooperation.

The Technology Development program is designed to make new, innovative, and effective technology available for use. New technology is sought to reduce risks, operating costs, operating time, and the generation of new waste. Investments in technology development today are expected to provide better, more permanent solutions to DOE's environmental and waste management problems in support of the 30 year goal. Hazardous chemical wastes are eliminated or reduced to acceptable concentrations preventing further spread of ground water and soil contamination. Progressive developments lead to demonstration, testing, and evaluation of better technology making it available for use in many of the DOE sites.

To support RDDT&E for environmental restoration, activities will address soil and groundwater contamination and include site assessment, characterization, and cleanup. An integrated technology program will be required to include development and demonstration of technologies for both generic and specific problems. Activities will also be supported to investigate remediation methods that will be capable of meeting all relevant Comprehensive Environmental Response, Compensation,and Liability Act (CERCLA), Resources Conservation and Recovery Act (RCRA), National Environmental Policy Act (NEPA), Atomic Energy Act (AEA), Occupational Health and Safety Act (OSHA) requirements, DOE orders, and applicable State and local requirements.

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To support RDDT&E for waste management operations, activities will focus on technology to produce acceptable waste materials compatible with disposal requirements and to produce a minimum of secondary waste requiring treatment and disposal. The major thrust will involve: process changes and chemical substitutions to eliminate or significantly reduce the amount of toxicity of hazardous and mixed waste generated; material recycling and reuse; and in process segregation and concentration of waste streams. Technology will be developed to prepare high-level liquid waste for processing; produce a solidified glass-ceramic material from calcine waste; treat waste from environmental restoration activities; and ensure permanent disposal in a manner that avoids costly, repetitive retrieval and management. The highest priority will be given to waste minimization and associated treatments.

Decontamination and Decommissioning activities will address new and innovative technologies that are safe and accurate and yield verifiable results. Both characterization tools and assessment methodologies will be specifically adapted to the unique nature of facilities, which range from relatively ordinary office/laboratory buildings to reactors, facilities for processing irradiated reactor fuels, and gaseous diffusion plants.

The Applied Research and Development program will identify technology needs in the areas of environmental restoration and waste management operations to rapidly advance beyond currently available technologies, and to provide solutions to key problems. This program will provide liaison with basic research programs conducted by the Office of Energy Research, the National Academy of Sciences, and other organizations pursuing fundamental knowledge.

The Demonstration Testing and Evaluation program will identify technologies in the applied R&D stage that are amenable to transition to the demonstration stage. It will develop cost-effective, efficient programs for integrated demonstrations and work with other agencies and industry to develop DT&E activities of mutual interest. It will work closely with the Environmental Restoration and the Waste Management operations programs to effectively transfer technology to full scale implementation.

The Educational Development program will focus on defining the problems associated with future resource needs; implementing new and enhanced education programs; and integrating resources from industry, universities, other Federal agencies, and the international community. Emphasis will concentrate within the DOE organization for the purpose of expediting the assessment and technology transfer of available and developing systems. This includes cooperative activities with the Environmental Protection Agency, industry, and universities, including financial assistance and contracts to develop innovative technologies.

Summary

Technology Development was organized as a separate supporting effort in FY 1990 and provided a significant increase in funds to accelerate needed developments on high-priority problems, i.e., those requiring better, more permanent solutions. An Applied Research, Development, Demonstration, Testing and Evaluation plan was issued for public comment. The comments, planning, and budget information was incorporated into the revisions to the Five-Year Plan. Emphasis is placed on improved or new technology for characterization of sites to determine the magnitude and extent of contamination spread and its physical and chemical nature. Industrial, university and DOE laboratory methods are being studied for the most capable and effective restoration and treatment techniques which can be applied to a broad range of DOE site problems. Establishing a separate technology development program provides the focus of scientific talent to effectively screen available and evolving technologies and provide demonstrated and proven methods for use.

Increased funding in FY 1991 is required to move the more promising technologies into demonstrations and evaluation of the performance of technologies for solving specific contamination problems. The funds provide for experienced industrial participation and support, university consortia, educational programs and DOE laboratories in an integrated approach to better technologies.

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(dollars in thousands)

LEAD TABLE

TECHNOLOGY DEVELOPMENT

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Operating Expenses:						
Applied Research and Development	$ 14,573	$ 39,840	$ 39,840	$ 39,840	$ 0	0
Demonstration, Testing and Evaluation	36,432	99,609	99,609	94,409	-5,200	-5
Innovative Technology	0	10,000	10,000	10,000	0	0
Program Support	0	10,000	10,000	10,000	0	0
Education	0	20,685	20,685	27,731	+7,046	34
Analytical Laboratory Management	0	0	0	2,000	+2,000	N/A
Subtotal, Operating Expenses	$ 51,005	$ 180,134	$ 180,134	$ 183,980	$ +3,846	+2
Capital Equipment	827	3,347	3,347	16,820	+13,473	+403
Construction	0	0	0	5,200	+5,200	N/A
Total, Technology Development	$ 51,832	$ 183,481	$ 183,481	$ 206,000	$ +22,519	+12

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DEPARTMENT OF ENERGY
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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

SUMMARY OF CHANGES

TECHNOLOGY DEVELOPMENT

FY 1990 Appropriation	$183,481
Adjustments	0
FY 1991 Base	$183,481
Program increases and decreases:	
Operating Expenses	
· Increase educational initiatives to assure that human resource requirements will be available to meet the 30-year commitment of the Five-Year Plan. This includes additional university partnerships, and additional scholarships and fellowships related to environmental management studies	+7,046
· Decrease Demonstration, Testing and Education operating expenses to provide for facility design and project management costs associated with the Environmental and Molecular Science Laboratory, Richland, Washington	-5,200
· Initiate analytical laboratory management activities including laboratory automation and common architecture, sampling methodology and analysis of complex mixtures	+2,000
Capital Equipment	
· Increase to support research and development and demonstration, test, and evaluation activities initiated in FY 1990	+13,473
Construction	
· Increase provides for facility design and project management costs associated with the Environmental and Molecular Science Laboratory, Richland, Washington, a facility where complex chemical interactions can be studied and technologies developed	+5,200
FY 1991 Congressional Budget Request	$206,000

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U.S. Major Laboratory and Facility Funding:

Program Activity	FY 1989 Actual	FY 1990 Appropriation a/	FY 1991 Request a/	% Change
Kansas City Plant	$ 338	$ 230	Information Not Available	
Los Alamos National Laboratory	136	1,225		
Sandia National Laboratories	384	7,702		
Rocky Flats Plant	1,912	3,115		
Albuquerque Operations Office	150	2,218		
Brookhaven National Laboratory	100	493		
Argonne National Laboratory	2,000	2,849		
Chicago Operations Office	0	1,050		
Idaho National Engineering Laboratory	11,768	24,323		
Idaho Chemical Processing Plant	2,000	2,118		
Idaho Operations Office	0	746		
Nevada Test Site	450	1,505		
Oak Ridge National Laboratory	1,325	7,407		
Oak Ridge Operations Office	0	889		
Oak Ridge Gaseous Diffusion Plant	7,347	9,575		
Oak Ridge Y-12 Plant	4,728	8,129		
Oak Ridge Associated Universities	0	642		
Pacific Northwest Laboratory	2,286	6,750		
Hanford Reservation	5,862	8,356		
Lawrence Livermore National Laboratory	1,600	1,700		
Lawrence Berkeley Laboratory	0	270		
San Francisco Operations Office	0	750		
Savannah River Site	1,649	2,772		
Savannah River Laboratory	3,895	6,283		

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a/ Distribution by laboratory and facility for portions of FY 1990 and the FY 1991 Request is not available due to the nature of the Technology Development program. As candidate technologies are pursued, funding distributions will be known only after activities are competed and the selection process completed.

III. Activity Description: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Applied Research and Development	Provides for identifying and screening waste minimization projects to determine the production systems to receive waste minimization R&D.	Initial projects for waste minimization are selected and planned.	Initial screening of waste minimization technology is completed and the more promising technologies are selected for development to rapidly move them into demonstration.
	Provided technical management and support functions for applied research and development projects.	Continue technical management and support for applied research and development projects.	Provides technical management and support functions for applied research and development projects.
	Provides the evaluation of alternative methods for characterizing sites, determining technology which should be developed and conducting the developments for environmental restoration and decontamination and decommissioning activities.	Continue development of cost-effective technology for environmental restoration and decontamination and decommissioning activities. More promising new methods for environmental restoration including groundwater treatment and soil remediation are investigated to provide risk and cost reductions to future operations.	Continue development of technology for environmental restoration. Develop cost-effective technology to support the characterization, removal and treatment of wastes associated with Decontamination and Decommissioning activities. Fiber optics coupled with analytical devices are developed to real time monitoring of sites. Characterization techniques are screened for possible demonstrations. Groundwater treatment and soil treatment methods are tested to determine applications for the technologies. Burial ground characterization and treatments are tested to stabilize sites and to destroy or remove hazardous chemicals and fix or stabilize the remaining material in situ.
	Provided for continuation of technology evaluation and cost savings estimates for TRU waste reduction systems. Evaluation and testing of TRU waste "begless" removal systems;	Continue technology evaluation of reduced TRU waste generation methods. Perform evaluation of begless posting through purchase, testing and glovebox installation. Continue to	Continues development and testing of technologies to produce acceptable waste materials compatible with disposal requirements. Develops technology for high-level liquid

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Applied Research and Development (Cont'd)	testing of microwave technology for sludge solidification; and destructive analysis of rare-earth coated crucibles.	evaluate effectiveness of sort-at-source program with performance testing in a selected facility. Continue cost-benefit analysis and production-scale design of microwave solidification system.	waste and calcine waste processing; waste minimization and volume reduction treatment; and low-level waste form stabilization and disposal methods.
	Completed generic computer model and initiated enhancements of TRUEX process for plutonium removal from waste. Completed solvent degradation studies and tested minicentrifugal contactors.	Publish TRUEX database report and update manual and computer software for generic TRUEX model. Complete fabrication of contactor unit for testing on Hanford Plutonium Finishing Plant (PFP) TRU waste. Complete draft reports on Argonne National Laboratory efforts related to TRUEX processing of Hanford PFP, double-shell tank, and single-shell tank wastes.	Initiates testing of contactor unit on Hanford Plutonium Finishing Plant.
	Continued to provide technical management of low-level waste R&D projects, including validating accelerated leach testing methodologies, evaluating lysimeter data for waste migration in the near surface, and improved stabilization techniques for LLW streams.	Continue technical support for LLW R&D projects. Determine the practicality and cost benefits of separation of slightly contaminated waste for alternative disposal methods. Provide for testing of concrete durability in near-surface environment.	Continues technical support for LLW R&D projects. Pursue most promising alternatives for separation and alternative disposal of slightly contaminated waste. Evaluate concrete durability tests.
	Continued investigation of technologies for hazardous and radioactive mixed waste demonstrations. Continued testing of paramagnetic separation, acid reclamation, and reactive metals stabilization processes.	Continue investigation and testing of alternative technologies for hazardous and radioactive mixed waste processing. Conduct pilot-scale testing of supercritical water oxidation process and plasma arc destruction for solid wastes. Complete conceptual design for remote fiberoptic monitoring for organic hazardous wastes.	Continues testing of alternative technologies for processing mixed hazardous and radioactive waste. Initiate final design of fiberoptic monitoring for organic hazardous wastes.
Subtotal, Applied R&D	$ 14,573	$ 39,840	$ 39,840

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III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Demonstration, Testing & Evaluation	Demonstrations were organized and implemented through the Hazardous Waste Remedial Actions Program (HAZWRAP). Demonstrations included plasma arc destruction of organic materials, gas cylinder disposal, solar photocatalytic detoxification, supercritical water oxidation, and metal finishing operations to minimize waste.	Continue HAZWRAP demonstrations including supercritical water oxidation, gas cylinder disposal, treatment and disposal of reactive metals, waste acid detoxification and remediation, landfill cap verification, and liquid carbon dioxide cleaning. Activities described in the draft RDDT&E plan are initially prioritized through a proposal process to select the more promising technologies for demonstration, testing, and evaluation.	DT&E is supported by HAZWRAP including management of specific DT&E projects, technical review, analysis, and evaluation of technologies and technology transfer. Specific DT&E projects include supercritical water oxidation for treating hazardous process effluents, plasma treatment and destruction of hazardous and mixed wastes, initiation of cyrogenic containment barrier demonstration, demonstration of robotics for handling and characterizing wastes to reduce worker exposure, bioremediation of a contaminated area, in situ vitrification of a contaminated area and real time onsite monitoring and characterization method. A regulatory interface will be established to work on criteria for delisting based on remediations and to establish cleanup goals and to support acceptance of a uniform risk management/assessment technology for regulatory review as the technology progresses.
	Major activities in technical support included quality assurance, waste research, development demonstration, program planning and coordination, and waste minimization. Initiatives included preparation of needs assessment, demonstration, program plans, current year work plans for waste minimization, and RD&D. Major DT&E initiatives included improved environmental restoration, mixed waste treatment technologies, and waste minimization.	Activities are the same as prior year with significant expension. The DT&E program addresses the development of technologies in characterization technology, soil remediation technologies, groundwater remediation technologies, decontamination and decommissioning process modification technologies, waste treatment, and waste disposal. Emphasis is placed on in situ remediation and waste minimization projects.	The DT&E program continues to expand with new projects beginning this year. Approximately 12-16 projects will complete DT&E and begin full implementation. Starts operation of a DOE test and evaluation center to expedite the implementation of innovative, cost-effective cleanup and assessment technologies.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Demonstration, Testing & Evaluation (Cont'd)	No activity.	Development of an integrated demonstration site was started at Savannah River to provide a test bed where DOE laboratories, industry and universities could demonstrate the capability of technologies for removal of organic chemicals from soil and groundwater. Demonstrations of in situ soil heating and melting were started at INEL and Savannah River as a method to provide long term containment. Technologies for characterization and analysis were emphasized. Joint demonstrations with EPA were conducted to show the effectiveness of high-temperature (plasma arc) processing to destroy organic materials.	Funding is increased to expand the selection and implementation of demonstrations to include the following major technical areas: characterization, groundwater treatment, soil remediation, waste minimization, decontamination and decommissioning and disposal. The best available penetration and sampling techniques for site characterization are demonstrated. Another integrated demonstration site is selected and developed for the evaluation of several technologies for their effectiveness in removal of contaminants from soil to prevent groundwater contamination. A systematic waste minimization demonstration project is started to show the magnitude of impact which can be realized during the preparation of metallic uranium. Projects are started to show the capability to arrest migration and provide temporary containment at a site until a favored permanent treatment can be selected and implemented. Integrated planning of operational, development, and demonstration requirements (road maps) will be developed based on the needs at Rocky Flats plutonium site and the Fernald uranium sites.
	Continued to demonstrate cost-effective technologies for hazardous and mixed waste compliance at DOE sites such as waste acid detoxification and reclamation, treatment and disposal of reactive metals, and supercritical water oxidation; and conducted technology transfer activities.	Cooperative interactions have been initiated with three hazardous substance research centers supported by EPA at Kansas State University, New Jersey Institute of Technology and Stanford University. Technical proposals from the represented consortia are reviewed and selected on the	Activities will include the evaluation of other remediation technologies that can be used in conjunction with the horizontal well technology. The remediation technologies would include hot air stripping, methane injection, biological degradation, radio frequency heating, etc. Other integrated demonstration projects

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III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Demonstration, Testing & Evaluation (Cont'd)		basis of attention to DOE needs for DT&E. Cooperative funding with EPA, DOE and university components is planned. Interactions with existing DOE participants are already involved with many of the ongoing demonstrations. Continue efforts to start additional joint EPA/DOE technology demonstration projects; 4 projects are probable. Cooperative efforts with DOD are being studied. The integrated demonstration continues to treat TCE-contaminated groundwater by using horizontal well-drilling technology combined with air stripping. Project guidance is by a multi-laboratory team.	will be continual. Cooperative efforts with EPA and DOD will be expanded.
	Supported RCRA applicable technologies developed through support of the Waste Research and Development Program and determined to be ready for demonstration.	Support RCRA applicable technologies through support of the Waste Research and Development Program and determined to be ready for demonstration.	Supports RCRA applicable technologies through support of the Waste Research and Development Program and determined to be ready for demonstration.
	Continued RCRA technology demonstrations with potential for cost-effective methods of RCRA compliance at DOE sites.	Continue RCRA technology demonstrations with potential for cost-effective methods of RCRA compliance at DOE sites. Demonstrations will be added to the program to address evolving needs. These include technologies such as photochemical and thermal destruction of hazardous and mixed wastes, paramagnetic separation, and chlorinated hydrocarbon substitution.	Continues RCRA technology demonstrations with potential for cost-effective methods of RCRA compliance at DOE sites. Demonstrations will be added to the program to address evolving needs.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Demonstration, Testing & Evaluation (Cont'd)	Continued waste minimization and reduction support activities, including training, instruction, technology development and transfer.	Provide technical support to the development of long-range planning and trend analysis reporting capability. Continue support for technology demonstrations and treatment, storage and disposal activities. Continue waste minimization and reduction support.	Provides technical support to the development of long-range planning and trend analysis reporting capability. Continue support for technology demonstrations and treatment, storage and disposal activities. Continue waste minimization and reduction support.
	Initiated technology support for implementing the DOE Byproduct Rulemaking.	Expand technology transfer activities, including waste minimization and information systems development and technology support for implementation of the DOE Byproduct Rulemaking.	Continues technology transfer activities, including waste minimization and information systems development and technology support for implementation of the DOE Byproduct Rulemaking.
	Provided for continued operation and development of the WIN system to assist in technology transfer and in implementation of innovative, cost-effective cleanup and assessment technologies.	Provide for continued operation and development of the WIN system to assist in technology transfer and in implementation of innovative, cost-effective cleanup and assessment technologies.	Provides for continued operation and development of the WIN system to assist in technology transfer and in implementation of innovative, cost-effective cleanup and assessment technologies.
Subtotal, Demonstration, Testing and Evaluation	$ 36,432	$ 99,609	$ 94,409
Innovative Technology	No activity.	Begin conduct of short-term (up to 18 months) experiments to determine needs for further R&D. Candidate technologies include: remote sensing of buried wastes; stopping migration of waste from leaking underground storage tanks; improved methods of reducing contaminated material to minimize dispersion of contaminants, in situ treatment of contaminents in soil, and recovering of transuranium elements from TRU waste to minimize volume of waste for disposal.	Completes short-term experiments initiated in FY 1990. Select most promising technologies and initiate verification tests. Emphasis will be on identification of additional needs and correlation of applicable technologies. The most promising technologies will continue to be developed using financial assistance, or contracts to involve industry, universities, etc.
Subtotal, Innovative Technology	$ 0	$ 10,000	$ 10,000

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Program Support	No activity.	Activity includes: program management/field office support; prioritization of research techniques; industrial integration efforts; international exchange; data base development; development of information systems; quality assurance/quality control; application of NQA-1; and integration of waste management and modernization.	Continues support activities in program management, prioritization techniques, industrial integration, international exchange, data base information systems development, quality assurance/quality control, and integration with modernization.
Subtotal, Program Support	$ 0	$ 10,000	$ 10,000
Education	No activity.	Education initiatives as described in the draft Applied Research, Development, Demonstration, Testing and Evaluation Plan provide the development of human resources required to meet the environmental restoration and waste management challenges. These efforts include the establishment of two university partnership pilot centers in New Mexico and South Carolina to support the regional needs of DOE facilities. Supplemental academic education and training efforts have also been initiated with fellowship grants to advanced degree candidates with research topics related to environmental management. Workshops and symposiums are planned to address the development of technicians and technologists. Integral to the education initiatives is the development of the educationally disadvantaged by outreach activities to maintain interest in science and mathematics leading to foundational skills	Education initiatives which were begun in FY 1990 will be increased to about one percent of the investment into Environmental Restoration and Waste Management funding to assure that human resource requirements will be available to meet the 30-year commitment of the Five-Year Plan. Following the pattern from the two university partnership pilot centers, an additional two university partnerships will be established to regionally support the Department's facilities environmental management technology development requirements. Additional scholarships, fellowships and financial assistance related to environmental management studies and research will be provided. Workshops on outreach activities for educationally disadvantaged will be conducted to collect lessons learned and achievements.

III. Activity Description: (New BA in thousands of dollars) (cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Education (Cont'd)		necessary for technical careers in environmental management.	
Subtotal, Education	$ 0	$ 20,685	$ 27,731
Analytical Laboratory Management	No activity.	No activity.	Determine DOE analytical needs; initiates studies to develop sampling methods; analyze complex mixtures, laboratory automation and common architecture.
Subtotal, Analytical Laboratory Management	$ 0	$ 0	$ 2,000
Total, Technology Development	$ 51,005	$ 180,134	$ 183,980

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

Technology Development

I. Preface: Capital Equipment

In FY 1991 the capital equipment request provides critical base research, development, demonstration, testing and evaluation (RDDT&E) equipment for all Technology Development activities. These equipment needs consist mainly of items specially adopted to Technology Development projects with a lifespan of several years that are either unavailable through rental or lease or for which rental or lease costs significantly exceed the purchase price. Increases cover the emphasis on new measurements of hazardous chemicals and the operation of demonstration projects. Equipment funding is distributed by major program areas as shown below.

II.A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request	% Change
Applied Research and Development	$ 236	$ 956	$ 5,550	+481
Demonstration, Testing and Evaluation	591	2,391	11,270	+371
Total, Capital Equipment	$ 827	$ 3,347	$ 16,820	+403

II.B. Major Laboratory and Facility Funding:

Argonne National Laboratory	$ 117	$ 404	Information Not Available a/
Oak Ridge Operations Office	0	298	
Oak Ridge Gaseous Diffusion Plant	710	0	
Los Alamos National Laboratory	0	108	
Sandia National Laboratories	0	74	
Rocky Flats Plant	0	966	
Idaho Chemical Processing Plant	0	98	
Idaho National Engineering Laboratory	0	690	
Oak Ridge National Laboratory	0	168	
Savannah River Site	0	541	

a/ Distribution by laboratory and facility for the FY 1991 Request is not available due to the nature of the Technology Development program. As candidate technologies are pursued, funding distributions will be known only after activities are competed and the selection process completed.

III. Activity Description: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
· Applied Research and Development	Provided minimal capital equipment support for ongoing RDDT&E activities including TRUEX technology.	Provide equipment for TRUEX technology, removal of chrominum using electronics, microwave fluid bed detoxification, and other applied R&D activities.	Provides for lab-scale innovative real-time analytical and monitoring equipment, computer equipment to assist in evaluation of the effectiveness of R&D projects, and bench-scale waste management and environmental restoration project equipment.
Subtotal, Applied R&D	$ 236	$ 956	$ 5,550
· Demonstration, Testing and Evaluation	Provided equipment for technology demonstrations in support of DOE sites RCRA compliance agreements and consent orders.	Provide equipment for technology demonstrations in support of DOE sites RCRA compliance agreements and consent orders.	Provides equipment for technology demonstrations in support of DOE sites RCRA compliance agreements and consent orders and testing of innovative technologies.
	No activity.	Initiate procurement of cryogenic containment equipment for demonstration at high priority site, pilot-scale robotic waste handling equipment to be installed in a high risk waste processing area at a Defense Programs site.	Provides for procurement of innovative characterization and monitoring equipment to be used in a site characterization demonstration; continues procurement of cryogenic containment equipment for demonstration at high priority site, pilot-scale robotic waste handling equipment to be installed in a high risk waste processing area at a Defense Programs site; in situ vitrification equipment to provide for full scale demonstrations; pilot scale remote exhumation equipment for demonstration of buried mixed waste retrieval; and, equipment required to demonstrate and evaluate the feasibility of bio-remediation methods.
Subtotal, Demonstration, Testing and Evaluation	$ 591	$ 2,391	$ 11,270
Total, Capital Equipment	$ 827	$ 3,347	$ 16,820

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ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

Technology Development

I. Preface: Construction

The Environmental Restoration and Waste Management program is responsible for the development of technologies to support environmental restoration and waste management operations. The Environmental and Molecular Science Laboratory is a basic research facility which will be supportive of Environmental Restoration and Waste Management goals. The laboratory is required to determine the molecular behavior of hazardous compounds under a wide variety of conditions. These include understanding the kinetics of migration, retardation of migration and alternative technologies for treatment of the chemical compounds. There are a variety of new biological concepts being explored for destruction of hazardous organic compounds, and this laboratory will allow for understanding and development of advanced technologies for this type of treatment. This laboratory will provide a facility where the complex chemical interactions can be studied and technologies developed.

II.A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request	% Change
Demonstration, Testing and Evaluation	$ 0	$ 0	$ 5,200	NA
Total, Construction	$ 0	$ 0	$ 5,200	

II.B. Major Laboratory and Facility Funding:

Program Activity	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request	% Change
Pacific Northwest Laboratory	$ 0	$ 0	$ 5,200	NA

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III. Activity Description: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Demonstration, Testing and Evaluation			
91-EM-100, Environmental and Molecular Sciences Laboratory	No activity.	No activity.	Project will provide a fully equipped and integrated facility needed to perform and expand molecular science basic research; it is proposed to accomplish the molecular research needs of the Department and is expected to become a focal point of molecular-level basic research in the United States. FY 1991 funding will provide support for facility design and associated project management costs.
Total, Technology Development	$ 0	$ 0	$ 5,200

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
Environmental Restoration and Waste Management
(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

IV. A. Construction Project Summary

Technology Development

Project Number	Project Title	Total Prior Year Appropriations	FY 1990 Appropriation	FY 1991 Request	Unappropriated Balance	TEC
91-ER-100	Environmental and Molecular Sciences Laboratory, Richland	$ 0	$ 0	$ 5,200	$ 0	$ a/
Total, Technology Development		$ 0	$ 0	$ 5,200		

a/ This request is for conventional facility design and associated project management funds for project initiation only.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
(dollars in thousands)
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Technology Development

IV. B. Plant Funded Construction Project

1. Project 91-EM-100, Environmental and Molecular Sciences Laboratory
Richland Washington

PROJECT TEC: a/
START DATE: a/
COMPLETION DATE: a/

2. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1991	$ 5,200	$ 5,200	$ 4,700
1992	0	0	500

3. Narrative:

The purpose of this project is the establishment of a collaborative research facility that will provide urgently needed scientific breakthroughs in molecular level processes. Breakthroughs in molecular level processes will provide knowledge and understanding of chemical material and biological sciences and the behavior and affects of these constituents in the natural environment. This can lead to applied Research, Development, Demonstration, Testing and Evaluation activities to find solutions to environmental and waste management problems.

This facility is necessary for the advancement of molecular science at an internationally competitive level and for the development of validatable models of environmental phenomena. Completion of this facility will provide the United States with a dedicated user facility for environmental and molecular science and a systematic vehicle for integrating the results of molecular science in models of environmental phenomena.

The FY 1991 funding will support definitive design and project management activities.

4. Total Project Funding (B/O): Not applicable.

a/ FY 1991 is for facility design and project management. The total estimated cost and exact construction dates and scope of this project are currently being reviewed within the Department. At the completion of design, a decision will be made on future support of the project.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Program Direction

The Environmental Restoration and Waste Management Five-Year Plan is the cornerstone of the Department's long-term strategy in environmental restoration and waste management; consolidating and coordinating DOE's clean-up activities. The Five-Year Plan consolidates activities in the areas of Defense Programs, Nuclear Energy, and Energy Research, treats them as a unified program and establishes an agenda for compliance and clean-up against which progress will be measured.

In November 1989, an Office of Environmental Restoration and Waste Management (EM) was established to manage and direct Five-Year Plan activities. The Department's FY 1991 Congressional Budget for Environmental Restoration and Waste Management has been proposed under a new, single appropriation account. Primary reasons for consolidating environmental management functions under one organization with a related single, appropriation account is to provide centralized management and planning for more focused control and validation of costs, schedule and prioritization of projects. These actions have also made it easier for the public to identify an organization and an appropriation account with the Five-Year Plan.

The FY 1991 Budget Request provides for 116 full-time equivalents (FTEs) at Headquarters to provide overall management of the Environmental Restoration and Waste Management program. Responsibilities include developing policy; administration-budget formulation and execution; long-range planning; monitoring and evaluating contractor performance; and providing the links between the Department and other agencies, the Congress, public interest constituencies and the private sector on EM activities. These programs require extensive coordination with other Federal agencies, property owners, State and local governments, the Indian Nations, and other nations. The budget request provides for only the essential staff level needed to continue to build an aggressive oversight Headquarters organization responsible for the Five-Year Plan. The program levels, with related responsibilities for Office of Environmental Restoration and Waste Management, will increase from $2.3 billion in 1990 to $2.8 billion in 1991. Program direction is to fund employee salaries, benefits, overtime, incentive awards, contractually provided support services, travel and printing and reproduction services.

The budget request also provides funding for 85 FTEs located at four DOE Operations Offices. This action is being taken by the Department to more accurately relate the staff costs associated with conducting environmental management activities in DOE's Operations Offices with the program sponsoring the work. This realignment will occur in FY 1990. It should be noted that DOE's Operations Offices are also being organizationally restructured to provide more focused attention to perform their local environmental management responsibilities and to better meet the increased requirements stemming from the new EM Headquarters organization.

II. A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Program Direction				
Headquarters	$ 5,060	$ 4,980	$ 19,939	+ 300
Operations Offices	440	570	4,167	+ 631
Total, Program Direction	$ 5,500	$ 5,550	$ 24,106	+ 334

III. B. Major Laboratory and Facility Funding

Not Applicable.

IV. Activity Description (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Headquarters	Provides for staff and related support cost for the overall management of the environmental restoration and waste management activities. Costs include personnel compensation, benefits, travel expenses and other program direction expenses related to program accomplish-ments. $ 5,060	Continue to provide for the staff costs and related support for the overall Headquarters management of the program. $ 4,980	Provides for 116 FTEs for the build-up of an aggressive Head-quarters organization responsible for Five-Year Plan activities. Major cost elements include: salaries and benefits ($10,267), travel and transportation ($990), printing and reproduction ($450), computer support and contractual service ($8,232). $ 19,939
Operations Offices	Provides for staff and related support costs for operations office direct personnel related	During FY 1990 DOE Operations Offices are being realigned to provide more focused	Provides full funding for 85 FTEs at the Albuquerque, Nevada, Oak Ridge Operations and Idaho offices to more

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	FY 1989	FY 1990	FY 1991
	to environmental restoration and waste management activities.	organizational elements devoted to environmental restoration and waste management activities. DOE has determined to cost those direct field personnel under the appropriation which fund the program. During FY 1990 85 FTEs (Albuquerque 56, Nevada 12, Oak Ridge 9 and Idaho 8) previously funded by other appropriation accounts will be the responsibility of EM.	accurately reflect the staff costs associated with conducting environmental management activities in the field.
	$ 440	$ 570	$ 4,167
Total, Program Direction	$5,500	$5,550	$24,106

VOLUME 3

GENERAL SCIENCE AND RESEARCH

DEPARTMENT OF ENERGY

FISCAL YEAR 1991 CONGRESSIONAL BUDGET REQUEST

VOLUME 3

GENERAL SCIENCE AND RESEARCH

Appropriation Language 187

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General Science Program Direction 279

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Department of Energy

Proposed Appropriation Language

General Science and Research Activities

For expenses of the Department of Energy activities including the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for general science and research activities in carrying out the purpose of the Department of Energy Organization Act (Public Law 95-91), including the acquisitions or condemnation of any real property or facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed [13, of which] 10 [are] for replacement only [and], including one [is a] police-type vehicle), [$1,114,431,000] $1,273,732,000, to remain available until expended, [:provided, That none of the funds provided in this Act for the Superconducting Super Collider shall be available to finalize or implement any agreements for either in-kind or direct contributions from foreign countries until a full report on such international contributions has been provided to the Congress, unless the President or Secretary of Energy certify in writing that it is in the national interest of the United States to implement such an agreement. Funds available for the Superconducting Super Collider may be utilized to prepare agreements to allow the above report to Congress to be formulated.] (Energy and Water Development Appropriations Act, 1990)

Explanation of Change

The language requiring a report to Congress on international contributions before any SSC funds are available to finalize or implement any agreements complicates the Department's ability to negotiate foreign agreements since the foreign countries may preceive uncertainty in the ultimate U.S. position.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH

OVERVIEW

HIGH ENERGY PHYSICS

Research in high energy physics is directed at understanding the nature of matter and energy at the most fundamental level and the basic forces which govern all processes in nature. The primary goal of the program is new knowledge and understanding. To carry out this forefront research, the program requires and develops advanced technologies for application to accelerators and detectors; these new technologies often find near term as well as long term applications in other fields.

Research in high energy physics is a stated part of the DOE mission and the DOE serves as the Executive Agent for the national program in high energy physics. Further, since the program supports basic research into the nature of matter and energy at the most fundamental level, the High Energy Physics program is directly relevant in the long term to the national goal of energy security.

The Physics Research section of the budget provides support for the scientists who perform the required research. The Facility Operations section of the budget provides support for the large accelerator and detector facilities essential to perform the research. The High Energy Physics Technology section of the budget provides for the R&D necessary to maintain the accelerator and detector facilities at the required forefront of the science. The Capital Equipment and Construction sections of the budget provide for the hardware and facilities required for the ongoing progress of the planned research program. Taken together, these activities provide for a balanced program of world class research in high energy physics.

In addition to the main objective of improved knowledge of matter and energy as described above, the High Energy Physics program provides, in the short term, strong stimulation for certain high technology areas of the U.S. economy (e.g., large scale computing, high speed electronics, low temperature superconductivity). Further, the High Energy Physics program has contributed and continues to contribute substantially to the field of accelerator design and construction. Thus, the present widespread application of accelerators in other areas of science and technology (e.g., medicine, materials science, microchip manufacture, and Strategic Defense Initiative (SDI)) is based on accelerator technology developed by the High Energy Physics (and Nuclear Physics) programs for their own purposes.

Experimental research in high energy physics most often requires the use of large particle accelerators, colliding beam devices, and large particle detectors. There are three DOE supported high energy physics accelerator centers: Fermi National Accelerator Laboratory (Fermilab), Stanford Linear Accelerator Center (SLAC), and Brookhaven National Laboratory (BNL). Each of these laboratories provides world unique research capabilities, and are operated as national facilities available to qualified experimenters on the basis of the scientific merit of their proposals. To these is being added the Superconducting Super Collider (SSC) which is included in a separate FY 1991 budget. Funding for researchers to work at all four of these facilities is included in this budget. Experiments by U.S. scientists are also carried out at the Cornell Electron Storage Ring and at foreign accelerators with unique capabilities not available in the U.S. Some important experiments do not require beams from accelerators but use detectors elsewhere, sometimes in deep underground or mountaintop laboratories. The experimental research, as well as theoretical research, is carried out largely by university based scientists.

The ability to carry out forefront exploratory research on the physics frontier is critically dependent on the experimental capabilities of the accelerator, colliding beam, and detector facilities, the effective utilization of those facilities, and the provision of upgraded and new facilities on a timely basis. The dependence of the program on facilities strongly influences program planning and strategy.

Two recently completed major upgrades of U.S. high energy physics facilities, the Stanford Linear Collider (SLC) and the Fermilab Tevatron Collider, are now in operation for research. These facilities will keep the U.S. program highly competitive and at the cutting edge for the next several years. Effective utilization of these facilities in the next few years is critical to the U.S. program.

More than 75 percent of the physics research done at U.S. high energy physics accelerator facilities is carried out by university-based scientists and the participation of university-based scientists is critical to the strength and vitality of the U.S. program. It is essential that the capability of university scientists to participate effectively in world forefront experiments be maintained. With the planned utilization of the existing facilities, particularly the Tevatron and SLC, strong continuing support for university-based scientists will be needed to allow effective participation by these scientists and to maintain the technical capabilities of the major university laboratories. Also, support for scientists participating in planning and in R&D activities related to the SSC is an increasing component of the high energy physics research activity.

After careful study it has been determined that a new, more powerful particle accelerator capable of exploring the Tev mass region is essential to advance understanding of the fundamental nature of matter and energy and to enable the U.S. High Energy Physics program to remain at the research frontier in the mid 1990's and beyond. The SSC will be a proton-proton collider having an energy of 20 Tev per beam. The SSC will permit exploration of this new domain of physics research which cannot be reached by any existing facility. Construction of the SSC and of the initial complement of detectors is requested in a separate SSC budget submission. The SSC is an integral part of the national high energy physics program; therefore, the basic research support for the physicists planning for and preparing experiments to be conducted at the SSC is now and will continue to be an integral part of the High Energy Physics program presented in this budget submission.

The strategy for the overall High Energy Physics program for FY 1991 revolves around the following key factors:

- Operation of the new world forefront research capabilities of the SLC collider and the Tevatron accelerator/collider at the maximum reasonable level. The Tevatron collider operations in FY 1991 will allow research utilization both of the fully mature Collider Detector at Fermilab (CDF) and of the just completed complementary new D-Zero detector facility. In addition, the Tevatron will have a major fixed-target run. The SLC will be operated for physics research for as many months as fiscally possible, with a new polarized electron beam capability to be commissioned during the year. The Positron Electron Project (PEP) electron-positron collider with the improved Time Projection Chamber (TPC) detector will also be operated at SLAC.

- Continued effective participation of university scientists is critical to the ongoing vitality of this program. University scientists directly carry out over three-fourths of the experimental and theoretical research in the field. Universities have a leading role in providing intellectual leadership for the field of high energy physics and in the training of highly skilled scientists and engineers for this and many other fields.

- Pursuit of long range accelerator and detector R&D studies to develop new and advanced concepts and technologies is critical to the long range viability and continued advancement of the program. Innovative new technologies are essential to the continued enhancement and extension of accelerator and detector capabilities for high energy physics research.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
OFFICE OF ENERGY RESEARCH
(dollars in thousands)
LEAD TABLE
High Energy Physics

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs Base	
					Dollar	Percent
Operating Expenses						
Physics Research	$121,586	$131,068	$131,068	$140,250	$+ 9,182	+ 7%
Facility Operations	246,447	260,216	260,216	278,715	+ 18,499	+ 7%
High Energy Technology	62,878	71,612	71,612	75,190	+ 3,578	+ 5%
Capital Equipment	79,747	84,065	84,065	88,180	+ 4,115	+ 5%
Construction	39,125	35,116	35,116	38,852	+ 3,736	+ 11%
Total	549,783	582,077	582,077	621,187	+ 39,110	+ 7%
Operating Expenses	(430,911)a/	(462,896)	(462,896)	(494,155)	+(31,259)	+ 7%
Capital Equipment	(79,747)	(84,065)	(84,065)	(88,180)	+ (4,115)	+ 5%
Construction	(39,125)	(35,116)	(35,116)	(38,852)	+ (3,736)	+ 11%
Total Program	($549,783)b/	c/($582,077)c/d/e/	($582,077)	($621,187)c/	$+(39,110)	+ 7%
Staffing (FTEs)	(Reference General Science Program Direction)					

Authorization: Section 209, P.L. 95-91.

a/ Total has been reduced by $5,469,000 ($3,536,000 Facility Operations, $1,933,000 High Energy Physics Technology) reprogrammed to Energy Supply for SBIR.
b/ Excludes $7,372,000 which represents applicable portion of $12,000,000 General Reduction contained in FY 1989 Appropriation.
c/ Reflects comparability adjustment for new Environmental Restoration and Waste Management program as follows: FY 1989 - $4,182,000; FY 1990 - $4,574,000; FY 1991 - $3,618,000.
d/ Excludes $11,251,000 which represents applicable portion of $21,000,000 General Reduction contained in FY 1990 Appropriation.
e/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

SUMMARY OF CHANGES

High Energy Physics

FY 1990 Appropriation		$ 582,077
Adjustments - Increased personnel costs		0
FY 1991 Base		582,077
- Funding required to maintain a constant overall level of program activity	+	24,047
Physics Research		
- Physics research at a level consistent with the operating level of facilities	+	3,677
Facility Operations		
- Increase in facility operations funding to provide for an improved level of operations for physics experiments at SLAC and Fermilab	+	7,570
High Energy Technology		
- Maintain constant level of effort for advanced high energy physics technology R&D	+	570
Capital Equipment		
- Maintain constant level of effort for capital equipment funding	+	584

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Construction		
- Reduction due to completion of AGS Accumulator/Booster in FY 1990	-	4,915
- Maintain constant level of effort for AIP and GPP required to support the accelerator facilities	+	211
- Increase for ongoing Fermilab Linac Upgrade project	+	7,366
FY 1991 Congressional Budget Request	$	621,187

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY SUMMARY

HIGH ENERGY PHYSICS

I. Preface: Physics Research

Provides support for university and laboratory based research groups conducting experimental and theoretical research in high energy physics. This research probes the nature of matter and energy at the most fundamental level, and the characteristics of the basic forces in nature. Experimental research activities include: planning, design, fabrication and installation of experiments; conduct of experiments; analysis and interpretation of data; and dissemination of results. Theoretical physics research provides the framework for interpreting and understanding observed phenomena and, through predictions and extrapolations based on existing theories, suggests key questions for future experimental explorations. This subprogram supports research groups at more than 100 universities as well as at the 11 DOE laboratories which participate in high energy physics research.

Experiments in high energy physics require the use of large particle accelerators, together with complex detection apparatus, to study the results of the collisions of high energy particles. The DOE-supported operating high energy physics accelerators are located at three existing central laboratories, Fermilab, SLAC, and BNL. These three, together with the SSC, which is under construction at the SSC Laboratory, are made available to qualified scientists on the basis of the scientific merit and promise of their research proposals. Detectors and experimental facilities are located at the DOE accelerator laboratories, at other accelerators around the world, and at a number of sites not associated with accelerators. More than 75 percent of the research done with these facilities is performed by university-based physicists. Because of the size and complexity of a typical high energy physics experiment, users from a number of institutions frequently collaborate on a given experiment. These research teams typically include a mix of physicists, engineers, technicians, and graduate students. After a research proposal to the laboratory is approved, the research teams participate in the design and fabrication of the experimental apparatus and provide manpower for the experiment during the data-taking phase at the laboratory. There is significant interaction and participation from laboratory staff and use of laboratory support facilities for each experiment. The entire process, from conception of the experiment to publication of results, typically takes up to five years if no major new detector is involved; if major detector design and fabrication is involved, the total duration can be several years longer. U.S. user groups also participate in experiments which take advantage of unique accelerator capabilities and opportunities at foreign laboratories such as DESY (West Germany), CERN (Western Europe), KEK (Japan), and SERPUKHOV (USSR). There is also a program of experiments not requiring beams from accelerators, of which experiments to search for proton decay and magnetic monopoles are presently the major component.

FY 1990 will be a year of strong research output from the world forefront SLC collider and Tevatron fixed target facilities. A very productive level of research activity is planned for FY 1991 as the data collected in FY 1989 and FY 1990 is analyzed and these facilities continue to operate in an intensive data taking mode. Experimental groups are planned to be supported at a continuing level consistent with the operating level of these facilities and with maintenance of the technical capabilities of the major university laboratories. In addition, FY 1991 is expected to include significant effort on planning for experiments for the SSC.

II. A. Summary Table: Physics Research

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Fermilab	$ 9,385	$ 8,735	$ 9,170	+ 5
SLAC	11,767	11,960	12,560	+ 5
BNL	7,851	7,710	8,095	+ 5
ANL and LBL	15,256	15,700	16,485	+ 5
Universities and Other Labs	77,327	86,963	93,940	+ 8
Total, Physics Research	$ 121,586	$ 131,068	$ 140,250	+ 7

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory	$ 5,676	$ 5,560	$ 5,840	+ 5
Brookhaven National Laboratory	$ 7,851	$ 7,710	$ 8,095	+ 5
Fermi National Accelerator Laboratory	$ 9,385	$ 8,735	$ 9,170	+ 5
Lawrence Berkeley National Laboratory	$ 9,580	$ 10,140	$ 10,645	+ 5
Stanford Linear Accelerator Laboratory	$ 11,767	$ 11,960	$ 12,560	+ 5

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Physics Research			
Fermilab	Fermilab staff perform experiments using the Fermilab facilities, while also providing a crucial support and liaison function for the many university users involved in experimental programs at Fermilab. Analysis of the data collected from the intensive FY 1988 operations for research of the upgraded fixed target facilities required a major effort, as did the preparation of the publications and theoretical interpretations of this new information. Fermilab researchers also participated strongly in extensive data taking in the Tevatron collider programs. In addition, there is an ongoing theoretical research activity as well as a small program of high energy astrophysics research.	At about a constant level of effort from prior years, the Fermilab research physicists will be involved in the physics analysis of the data processed from earlier runs and in the collection of new data in a lengthy and extensive operation of the fixed target research program. Theoretical and high energy astrophysics research efforts will continue at a steady level of effort. Preparations for the full completion of the D-Zero detector and the FY 1991 colliding beams research programs will also be undertaken.	The Fermilab research groups will shift their overall emphasis somewhat in order to participate in the first operations for colliding beam physics research of the newly completed D-Zero major detector facility which will occur in FY 1991. Analysis of the fixed target program data taken in FY 1990 and early in FY 1991 will be a major activity, as will the preparation for the next scheduled fixed target experiments. The theory groups will continue to pursue the most topical new experimental results.
	$ 9,385	$ 8,735	$ 9,170
SLAC	The SLAC research groups focused their efforts on collaborative experiments with university groups related to SLC operation with first data taking on the Mark II detector at SLC and the first operation for research of the upgraded PEP facility with the upgraded TPC detector. In addition, there was operation of SPEAR for high energy physics. The SLAC research groups were heavily involved in conducting experiments and data taking. There was also a strong theoretical research activity.	The continued luminosity improvements of the SLC will require increased efforts in data taking and data analysis. The research groups will continue to study Z zero particles with the Mark II detector. The new SLD detector will undergo tests and commissioning with the possibility of a first physics run late in the year. Data taking at PEP will continue.	With the scheduled completion of SLD (late in 1990) and the SLC polarized beam as well as substantially increased luminosity, it is expected that realization of the full physics potential for SLC will be approached in FY 1991. Analysis of data from Mark II's previous running at SLC will continue, and research groups will make use of SLC's unique characteristics to study Z zero and other physics in this energy region. FY 1991 is expected to be a very productive year. Data taking at PEP will continue.
	$ 11,767	$ 11,960	$ 12,560

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III. Physics Research (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
BNL	The AGS program includes a wide variety of fixed target experiments. For FY 1989, the BNL research groups focused on experiments at the AGS with significant emphasis on operation of the new generation of rare kaon decay experiments. Other BNL activities include participation in preparation for the D-Zero experiment at Fermilab, and in experiments at CERN.	The program will continue FY 1989 activities with significant emphasis on rare kaon decay experiments. Fabrication of detectors for a new neutrino oscillation search is expected to begin. Preparation for the D-Zero experiment at Fermilab will continue. Study of proton-proton elastic scattering with the AGS polarized beam will continue.	With the scheduled completion of the AGS booster providing about a four-fold increase in proton beam intensity, and about a 25 fold increase in the polarized proton beam intensity, more precise studies in the rare kaon decay experiments and in proton-proton elastic scattering with the polarized beam will be undertaken. Early beam tests of the muon anomalous magnetic moment (g-2) experiment are planned. An important part of BNL research will be devoted to data taking and data analysis related to the scheduled first operation of the D-Zero experiment at Fermilab's Tevatron.
	$ 7,851	$ 7,710	$ 8,095
ANL and LBL	These groups concentrate their efforts as users at the U.S. accelerator centers and at foreign facilities with unique capabilities. The LBL program includes important participation with the Mark II experiment at SLC, the leading role in the research with TPC at PEP and in the CDF experiment at Fermilab as well as a large theoretical effort and the Particle Data Center. The ANL program is highlighted by important participation in the ZEUS experiment and in the SOUDAN II proton decay experiment.	These programs remain at about a constant level of activity with continued emphasis on ANL leadership of the U.S. participation in the ZEUS electron-proton project at DESY and on LBL's data taking schedules at the new Fermilab and SLAC facilities and analysis of data for physics results. Both are involved in the conceptual design of potential SSC experiments.	With the increased opportunities for physics research with world-wide facilities reaching energies and intensities previously unavailable, these groups of researchers will concentrate on data taking and data analysis with detectors at SLAC and Fermilab. The LBL efforts will be concentrated on CDF and the newly commissioned D-Zero detector at Fermilab. The ANL program will be concentrated on SOUDAN II and on the newly commissioned ZEUS detector at DESY in Hamburg.
	$ 15,256	$ 15,700	$ 16,485

III. Physics Research (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Universities and Other Labs	This program supports experimental and theoretical research groups at about a hundred universities throughout the nation. The university groups participate in experiments at the major U.S. accelerator facilities and at foreign accelerator facilities with unique capabilities, as well as in non-accelerator experiments and theoretical research. The level of effort is appropriately scoped relative to the level of facility operation.	The funding for the university program will be significantly increased to enhance the capability of university groups to participate effectively in world forefront research and to meet the extraordinary costs of U.S. experiments at remote and foreign facilities. Further, funding will be provided to begin to restore the technical capabilities of major university laboratories. Also, U.S. researchers will be participating in the experiments L3, ALEPH, DELPHI, and OPAL at CERN's LEP electron-positron collider. Also includes continued funding for computer acquisitions at MIT.	University groups will participate in major experiments at U.S. and foreign laboratories and scientists will engage in planning and R&D activities in preparation for experiments at the SSC. Important new experiments include the SLD experiment at the SLC (SLAC) for precision studies of electron-positron beam collisions producing Z particles; the D-Zero experiment at the Tevatron (Fermilab) to study proton-antiproton beam collisions, complementing the CDF experiment; and, the ZEUS experiment at HERA (DESY) to study electron-proton beam collisions at high energies. The manpower, technical, and computational capabilities of leading universities will be increased somewhat to better analyze the voluminous data produced by cutting edge experiments.
	$ 77,327	$ 86,963	$ 93,940
Physics Research	$ 121,506	$ 131,068	$ 140,250

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY SUMMARY

HIGH ENERGY PHYSICS

I. Preface: Facility Operations

Provides funding for the operation of accelerators, colliders, secondary beam lines, detectors for experiments, experimental areas, central computing and computer networking facilities. Includes the costs of manpower, electric power, expendable supplies, and inventories. The major DOE supported facilities to be operated in FY 1991 are the Fermilab Tevatron (800 GeV proton fixed target and 900 GeV on 900 GeV antiproton-proton colliding beams); SLAC (50 GeV linear accelerator serving as injector for the PEP 15 GeV on 15 GeV electron-positron collider, and the SLC 50 GeV on 50 GeV electron-positron collider); and the BNL AGS (30 GeV proton and polarized proton fixed target program). The world forefront SLAC SLC and Fermilab Tevatron accelerators will both be available for a significant amount of physics operation in FY 1991.

II. A. Summary Table: Facility Operations

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Fermilab Operations	$ 122,744	$ 129,780	$ 139,385	+ 7
SLAC Operations	80,200	85,250	91,410	+ 7
BNL-AGS Operations	41,928	36,825	39,185	+ 6
Other Operations	1,575	8,361	8,775	+ 5
Total, Facility Operations	$ 246,447	$ 260,216	$ 278,715	+ 7

II. B. Major Laboratory and Facility Funding

Brookhaven National Laboratory	$ 41,928	$ 36,825	$ 39,185	+ 6
Fermi National Accelerator Laboratory	$ 122,744	$ 129,780	$ 139,385	+ 7
Stanford Linear Accelerator Laboratory	$ 80,200	$ 85,250	$ 91,410	+ 7

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Facility Operations			
Fermilab Operations	During FY 1989 the superconducting Tevatron was in full operation for research in the antiproton-proton collider mode for 35 weeks with another 3 weeks of accelerator studies. The original design luminosity of the facility was more than exceeded and the total amount of data provided to the experiments was ten times greater than had been earlier anticipated. The major general purpose Collider Detector at Fermilab (CDF) facility recorded some 6,000 high density magnetic tapes full of raw data. Two smaller collider experiments, an elastic scattering & a search for the quark-gluon plasma, were fully completed during this period. This was the most successful collider run on record. Preliminary results from the physics analysis are beginning to emerge, and already a new lower limit of 60 GeV for the mass of the hypothesized top quark has been set. $ 122,744	It is planned to operate the superconducting Tevatron for research for 30 weeks during FY 1990. The first three months of the year will be a cooldown and restart period for the Tevatron. This will be followed by operations for the fixed target research programs. This period includes the first research utilization of a new gas jet fixed target facility in the antiproton accumulator ring. Sixteen major physics experiments will be in operation during this year. Four are continuations from the FY 1988 fixed target run and the other twelve are new efforts. In addition, three test beams will be operated for detector development and calibration. $ 129,780	The Tevatron is planned to be in operation for physics research in FY 1991 for about 36 weeks. The fixed target research program and test beam activities will resume early in the fiscal year and be operated for about 20 weeks. Then, after a few months shutdown to move in the detectors and do routine maintenance on the Tevatron, the antiproton-proton colliding beam research program will start up again. This will involve two major detector facilities: the seasoned and upgraded CDF detector and the recently completed and complementary new D-Zero detector. Thus, the effective physics utilization of the Tevatron collider will be effectively doubled from its previous run in 1989. $ 139,365
SLAC Operations	SLAC operated for about 22 weeks for physics research with the SLC, mostly at 60 pulses per second (pps). Operation at PEP and SPEAR for high energy physics also took place for 8 weeks at the beginning of the year. Upgrade of the control computing facility continued. $ 60,200	SLAC has scheduled about 30 weeks of SLC operation at 60 to 120 pps for physics research. It is planned that PEP operation with TPC will take place concurrently with SLC for much of the running period. $ 65,250	SLAC has scheduled about 36 weeks of SLC operations at 60 to 120 pps for physics research. It is planned to operate PEP concurrently with SLC for much of the running period. Polarized beams in SLC are expected to be regularly available in the latter half of FY 1991. $ 91,410

I.1. Facility Operations (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
BNL-AGS Operations	The AGS operated for about 20 weeks for high energy physics, primarily with slow beam extraction. Studies of rare kaon decays were emphasized. Additional operation of about seven weeks took place for heavy ion physics funded by Nuclear Physics.	The AGS is scheduled to operate for about 13 weeks for high energy physics to be split among the various modes. Emphasis will be on rare kaon decay experiments. Additional operation of 7 weeks is planned for heavy ion physics funded by Nuclear Physics. Total AGS operation in FY 1990 would be about 20 weeks.	The AGS will operate for about 14 to 18 weeks for high energy physics. The new AGS accumulator/booster will be commissioned. Rare kaon decay experiments will continue. About 10 weeks of heavy ion physics funded by Nuclear Physics is also planned.
	$ 41,928	$ 36,825	$ 39,165
Other Operations	Funding is provided to LBL for its participation in the operation, maintenance and upgrading of the Time Projection Chamber (TPC) detector at PEP. It also provides for increases in special stores, and other specialized activities to meet requirements for effective operation of the accelerator laboratories. Funding for the SBIR assessment has been transferred to the SBIR program.	Continuation of FY 1989 program at about same level of effort. Includes computer networking activities. Also includes funding for the SBIR assessment on the HEP program. Implementation plans for the Energy Sciences Network project, identified in the Applied Mathematical Sciences subprogram of the Basic Energy Sciences program, will proceed. The HEP program's share for the implementation of ESNET is $1,085.	Continuation of FY 1990 program at a decreased level of effort. Includes computer networking activities. Also includes funding for the SBIR assessment on the HEP program. Upgrade of ESNET to conform to the National Research and Education Network standards will continue to be pursued. The HEP program share will be about the same level as in FY 1990.
	$ 1,575	$ 8,361	$ 8,775
Facility Operations	$ 246,447	$ 260,216	$ 278,715

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY SUMMARY

HIGH ENERGY PHYSICS

I. Preface: High Energy Technology

Provides the technological base for maintaining and improving the scientific effectiveness, reliability, and efficiency of existing facilities and for extending the capabilities of accelerators, colliders, and detectors by developing and proving new concepts and technologies. Includes R&D with a near term focus in support of current, ongoing construction projects, fabrication of major detectors, and improving existing capabilities. There is also a strong longer term focus on development of advanced concepts leading to greater performance capability and more cost effective operation of accelerator and detector facilities. Includes theoretical studies of accelerator physics; exploration of new concepts for particle acceleration, storage, and transport; and fabrication and testing of apparatus based on these studies. Also includes studies of new types of detectors and improved detector performance. The High Energy Physics Technology program is carried out primarily in the DOE laboratories, but with a significant program of advanced concept development in universities and industry. Since the limits of present accelerator technology are being reached by present generations of existing and planned machines (SSC, LEP at CERN), a strong effort focuses on a search for new accelerator technologies applicable to the long term future (beyond the year 2000) of particle beam physics.

II. A. Summary Table: High Energy Technology

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Fermilab	$ 15,400	$ 15,905	$ 16,700	+ 5
SLAC	15,450	14,960	15,705	+ 5
BNL	12,764	13,575	14,255	+ 5
LBL	7,680	8,025	8,425	+ 5
Universities and Other Contractors	11,584	19,147	20,105	+ 5
Total, High Energy Technology	$ 62,878	$ 71,612	$ 75,190	+ 5

II. B. Major Laboratory and Facility Funding

Brookhaven National Laboratory	$ 12,764	$ 13,575	$ 14,255	+ 5
Fermi National Accelerator Laboratory	$ 15,400	$ 15,905	$ 16,700	+ 5
Lawrence Berkeley National Laboratory	$ 7,680	$ 8,025	$ 8,425	+ 5
Stanford Linear Accelerator Laboratory	$ 15,450	$ 14,960	$ 15,705	+ 5

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III. Activity Descriptions (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
High Energy Technology			
Fermilab	R&D is directed at improving Tevatron luminosity by reducing emittance, increasing beam intensity and reducing interaction point beam spot sizes. Tests of reduced operating temperature of the Tevatron superconducting magnets will begin. Tests of a new accelerator structure and development of higher power klystrons for the Linac Upgrade project will begin. Studies of the antiproton source will be carried out to improve the yield, cooling rate, and emittance of the antiproton beam. Facility R&D continues general support activities for fixed target and colliding beam technology. Design of high gradient 1.8K quadrupole magnets for the D-Zero interaction region will focus on fabrication of prototypes. While work continues on the CDF detector, a high emphasis is placed on support of D-Zero detector and of data analysis tools.	R&D to increase the energy, intensity and luminosity of the Tevatron will be expanded. This will include increased R&D in support of the Linac Upgrade project and work on a new radio frequency quadrupole preinjector, evaluation of improved accelerating structures, test of new radio frequency drivers, and design of a new 400 MeV linac-to-booster transport line. An enhanced program of reducing beam losses in the booster, main ring, and Tevatron machines will be undertaken as will a program to improve performance of the antiproton source. A major new emphasis during this period will be R&D addressing the optimum scheme for improving the performance of the intermediate energy acceleration system which operates between the 8 GeV booster and the Tevatron. The present intermediate acceleration system is the original warm iron magnet Main Ring. A second emphasis will be R&D for future luminosity improvements for the superconducting Tevatron storage ring. R&D in support of detector facilities will include improved beamlines and beamline controls and special work on improved CDF detector performance.	The program to improve the performance of the accelerator and storage ring subsystems set in motion over the previous several fiscal years will continue. These include work on the linac low energy injection systems and on the booster instrumentation, radio frequency systems, beam damper systems and beam dynamics studies. Main ring beam transmission will continue to be improved through improved diagnostics and machine studies. The antiproton source particle production will be raised through improving beam cooling hardware, production target performance by sweeping the proton beam, increasing target beamline particle acceptance, and improving controls. Studies to lower Tevatron temperature by .5 K and reach 1000 GeV will continue. Work will be done to shorten significantly the change over time from Tevatron collider mode to fixed target mode of operation. There will be a strong effort in support of the Linac Upgrade construction project. The effort begun in FY 1990 on luminosity improvements, much of which involves studies for the new Main Injector, will continue. The generic detector R&D program, which concentrates studies on experimental area beams and devices, colliding beam experimental facilities (CDF and D-Zero), charged particle detector R&D, developing improved data handling methods, and advanced computing methods R&D, will continue.
	$ 15,400	$ 15,905	$ 16,700

III. High Energy Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
SLAC	As SLC technology becomes understood, and operation for physics research gets underway, R&D was redirected toward improving luminosity and performance, and to make further progress on linear collider technology. Installation and testing of major systems of the SLD will be carried out. Studies of advanced concepts, particularly new, high power, high efficiency radiofrequency sources will also be pursued.	An expanded program of R&D on the collider is directed toward the luminosity improvements necessary to support full physics utilization of the SLD. Studies of advanced collider concepts increase as prototype accelerator and final focus components are tested and evaluated. Development continues on high power sources and high gradient accelerating structures. R&D will be done in support of a final focus test facility using existing SLAC beam lines to study nanometer radii beams. Studies of the ultra high current operation of the PEP storage ring for BB-bar production will begin.	Successful operation of the SLC has revealed new R&D information on the performance and operation of linear colliders. Studies based on these results will be undertaken for the dual purpose of improving operating performance and efficiency of the SLC and of guiding and aiding studies of linear colliders that can operate in the TeV range. Improvements in luminosity and reduction of background will particularly focus on enhancing the performance of the SLD detector during its first physics run. Advanced accelerator R&D will continue with development of several new high power radio frequency sources operating at 11 GHz or higher and 100 MW or higher. They will be tested and evaluated in terms of technical suitability and cost effectiveness. Some of these will be tested with radically new high gradient accelerating structures. Work will continue on a new final focus test facility begun in FY 1990 to study electron and positron beams of nanometer radii. The generic activities in support of detector technology development will continue.
	$ 15,450	$ 14,960	$ 15,705
BNL	Program includes continued R&D support for the AGS Accumulator/Booster construction project, and improved polarized proton operation of the AGS, a continuation of the superconducting magnet R&D program, and studies of advanced accelerator concepts, including assembly and tests of an advanced test facility for laser accelerator studies.	Continuation of R&D programs for improved AGS intensity, duty cycle, flexibility of operation and reliability, and for reduced beam loss and maintenance; for Booster project support, such as magnet measurements, beam electrode characterization, machine modelling studies and applications software for beam control and diagnostics; for improvement of particle detectors, beam lines and targets for AGS experiments including preparation for measurement of the muon	Continued R&D programs to improve AGS operation, commission the Booster and integrate it into the Physics Program; improvement of particle detectors, beam lines and targets for AGS experiments; continuation of a program of experiments with the Advanced Test Facility for laser acceleration studies.

III. High Energy Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
BNL (Cont'd)		g-2 value; and for first operation and startup of the program of experiments with the Advanced Test Facility for laser accelerator studies.	
	$ 12,784	$ 13,575	$ 14,255
LBL	Program continues at nearly a constant level of effort. Focus continues on superconducting magnet, beam cooling and detector equipment R&D. Preparations for a two beam accelerator test using the rebuilt Experimental Test Accelerator at LLNL and experimental studies of the relativistic kylstron radiofrequency power source will continue.	R&D programs continue on superconducting magnet technology; beam instrumentation and cooling; accelerator theory; the physics of the relativistic klystron, the two-beam accelerator concept; and on advanced detector components, systems and instrumentation. Studies begin on operation of very high current storage ring technology to yield very high luminosities.	R&D continues on high-field superconducting magnet technology; beam instrumentation and cooling; advanced accelerator theory and experiment; advanced relativistic klystron theory and testing on the Experimental Test Accelerator at LLNL; very high current operation of storage rings; and R&D on advanced detector systems.
	$ 7,680	$ 8,025	$ 8,425
Universities and Other Contractors	This subprogram supports a broad range of advanced topics in advanced accelerator and detector technologies needed to maintain a strong experimental research capability in high energy physics. Research carried out in universities, industry, research institutes, and other government research centers (e.g. NBS, NRL, etc.) addresses topics ranging from development of industrial consensus standards for superconductors, through new and advanced accelerator concepts, such as the use of lasers and collective effect phenomenon to accelerate charged particles, and new theoretical concepts in non linear charged particle beam dynamics. The focus of this work is on technologies applicable beyond the year 2000. Some exploratory work on the development and potential application of very high critical field superconductors	Continuation and expansion of the base program to utilize the special resources of universities, industry, research institutes, and government laboratories to address a broad spectrum of long range advanced technology development. A concerted effort will be made to expand the search for promising new charged particle beam acceleration concepts. First major tests of advanced accelerator concepts identified as feasible in prior year R&D will be undertaken at the advanced accelerator test facilities established as user centers at BNL and ANL. R&D on advanced, generic technology essential for large detectors operating at high event rates will be expanded to its planned level. Also includes funding for the SBIR assessment.	Continuation of the FY 1990 program. Focus continues to be utilization of the special resources of universities, industry, not for profit research institutes, and governmental laboratories to address a broad spectrum of technology development important to the very long term future productivity of the physics research. Several major tests of new charged particle acceleration schemes should be in progress at advanced test facilities established at BNL, ANL and elsewhere. Work on very high field superconducting magnets will be in progress. R&D will continue on advanced, generic technology essential for future detectors. Also includes funding for the SBIR assessment.

III. High Energy Technology (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Universities and Other Contractors (Cont'd)	(including chevrel phase compounds and the new high critical temperature materials) to accelerator magnets will be started.		
	$ 11,584	$ 19,147	$ 20,105
High Energy Technology	$ 62,878	$ 71,812	$ 75,190

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY SUMMARY

HIGH ENERGY PHYSICS

I. Preface: Capital Equipment

Capital Equipment funding is required to provide the secondary beam line components, particle detection apparatus, portable shielding, and data analysis systems essential to do high quality, forefront high energy physics experiments. It is also required for replacement of accelerator and detector facility components that have worn out or become obsolete. A proper complement of detectors and secondary beams is essential for effective utilization and operation of the major high energy physics accelerator and colliding beam facilities.

Timely introduction of new beam and detector capabilities, and the regular upgrading and modification of existing capabilities, is essential. The large scale of the equipment required for high energy physics research systems is illustrated by a few examples: a typical secondary beam line can range from several hundred feet to a mile or more in length, and requires many beam transport, beam shaping and control elements; the portable shielding required around detectors and targets can involve arrays of hundreds of shielding blocks weighing as much as 10 tons each; the analysis magnets incorporated in detection systems weigh many tons; large calorimeters of 300 tons or more are not uncommon; and electronics systems with hundreds of thousands of data channels are typically required for major detectors. A time span of as much as five years or more is often involved from design, through fabrication, to installation, checkout, and operation of these large systems. Examples of specific items of equipment needed include: beam transport magnets; large analysis magnets for detector systems; precision regulated power supplies; particle beam diagnostic and control systems; electronic and optical detectors with precision spatial and time resolution; high precision calorimeters and tracking chambers for colliding beam detectors; high speed and large volume data processing systems; special cryogenic components for liquid hydrogen targets and superconducting devices; and a host of specialized electronics and other items of laboratory support equipment. Priority is given in FY 1991 to final completion of two major new collider detectors, one for SLC and one for the Tevatron, and to an upgrade of the Fermilab Central Computing Facility.

II. A. Summary Table: Capital Equipment

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Fermilab	$ 27,557	$ 29,860	$ 31,300	+ 5
SLAC	19,865	21,850	22,900	+ 5
BNL	5,457	5,440	5,710	+ 5
Universities and Other Laboratories	22,818	22,675	23,820	+ 5
BNL- General Purpose Equipment	4,050	4,240	4,450	+ 5
Total, Capital Equipment	$ 79,747	$ 84,065	$ 88,180	+ 5

II. B. Major Laboratory and Facility Funding

Brookhaven National Laboratory	$ 5,457	$ 5,440	$ 5,710	+ 5
Fermi National Accelerator Laboratory	$ 27,557	$ 29,860	$ 31,300	+ 5
Stanford Linear Accelerator Laboratory	$ 19,865	$ 21,850	$ 22,900	+ 5

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Capital Equipment			
Fermilab	Major progress towards completing the D-Zero detector in 1Q91 ($13,107); upgrades and improvements to fixed target detectors and secondary beam lines ($7,500); upgrades to the capabilities of the CDF detector ($2,200); site-wide additions to computing and networking capabilities ($2,150); accelerator R&D, and general site equipment ($2,600).	Full completion of the new D-Zero detector facility is expected in FY 1991. Commissioning of the partially completed detector with cosmic rays, and extensive component calibration in test beams, will take place in FY 1990, and most of the subsystems will become fully operational. ($9,900); major improvements to the CDF detector system, including components of the muon detection system upgrade and enhanced particle tracking capabilities in the small angle regions ($5,100); upgrades, improvements and new capabilities for the Fermilab fixed target detectors and beam lines, ($7,500); ongoing additions and improvements to computing and networking capabilities for the experimental areas and the central computing facility ($3,200); equipment needed in support of the accelerator complex, the accelerator R&D programs and for general purpose site support, with special efforts towards replacement of obsolete accelerator controls systems electronics and control computer equipment ($4,160).	The D-Zero detector facility will be fully completed during FY 1991 with the purchase and installation of the final electronics components. Minor upgrades to accommodate the increased luminosity expected in the near future will also be made ($4,000); significant upgrades to the CDF calorimetry and electronics, and an extension to larger acceptance of the massive muon detection systems, will be carried out ($7,300); modifications, improvements and new detector and secondary beam components in support of the fixed target research programs ($7,000); a significant addition to the Fermilab general computing capabilities and facilities in order to handle the huge amounts of raw data generated by both the collider and the fixed target research programs ($6,700); equipment needed for accelerator R&D, in support of the entire accelerator complex, including systems instrumentation needs, controls, local computing and cryogenic components, and for general site needs. ($6,300).
	$ 27,557	$ 29,860	$ 31,300

III. Capital Equipment (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
SLAC	Major progress on the SLD detector, on schedule for completion late in 1990 and first limited physics late in 1989 ($13,500); complete polarization of SLC beams and superconducting quadrupoles for SLC luminosity upgrades ($2,800); improvements to PEP and SPEAR detectors ($1,000); general computer equipment ($1,600); general laboratory support equipment ($965).	Major emphasis on completing the SLD detector with strong expectation of first full physics run late in FY 1990 ($6,500); upgrade polarization capability of SLC beam and complete the superconducting final focus for use with SLD ($1,000); general support for PEP detector ($2,000); upgrade of the central computing facility ($6,500); general computer equipment ($2,100); general laboratory support equipment ($3,750).	Major emphasis on completely commissioning the SLD detector and providing needed support for SLC ($3,400); support for Advanced Accelerator R&D ($3,400); new vertex detector for TPC at PEP ($1,000); other new experiments ($2,090); computing hardware ($3,300); and general laboratory equipment including new machine tools, HVAC upgrades, and a new 12.4 kv substation ($9,710).
	$ 19,865	$ 21,850	$ 22,900
BNL	Major emphasis on new experimental initiatives ($1,600); beam line components ($1,000); support for ongoing experiments ($1,300); support for accelerator R&D ($900); and general AGS support equipment ($657).	Continued emphasis on new experimental initiatives ($1,900); beam line components ($1,000); support for ongoing experiments ($1,300); support for accelerator R&D ($700); and general AGS support equipment ($540).	Significant funding for g-2 experiment ($1,600); support for other experiments ($1,310); beam line components ($1,100); accelerator R&D ($760); and general AGS support ($940).
	$ 5,457	$ 5,440	$ 5,710
Universities and Other Laboratories	This supports the major capital equipment needs of the experimental research groups at the universities, as well as at the non-accelerator laboratories (LBL, ANL, AMES). Provides funding for detectors and detector components to be used to do experiments at U.S. and foreign accelerators, for non-accelerator experiments, and for computational capabilities. The major effort is for Tevatron and AGS experiments, and the substantial participation in the LEP-L3 detector which is under MIT leadership. Another major effort includes U.S. participation in the ZEUS detector at HERA.	Equipment needs will continue for experiments at U.S. accelerators and for non-accelerator experiments. Additionally, equipment funding will be needed for the HERA experiments and for completion of the LEP experiments. Special consideration will be given to enhancing the technical capabilities of university laboratories and to the upgrade of local computational capabilities.	The U.S. ZEUS Collaboration will complete the central calorimeter of the ZEUS detector and thus permit initiation of a full program of electron-proton collider research at the new HERA accelerator in Hamburg, W. Germany. At Fermilab, university-based scientists will prepare and install instrumentation for fixed target experiments which will provide new knowledge into the mechanisms by which charm and beauty quarks are created and decay. Several new experiments are anticipated involving precision measurements of particle properties and/or non-accelerator experiments on high energy particle astrophysics. Throughout the university program, there is an ongoing need for upgrade of computer and other data analysis equipment, as well as infrastructure

III. Capital Equipment (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Universities and Other Laboratories (Cont'd)			equipment for design and fabrication of experimental equipment, in order that university-based physicists fully and actively contribute to high energy physics research on campus.
	$ 22,818	$ 22,675	$ 23,820
BNL - General Purpose Equipment	Provide general purpose equipment at the Brookhaven National Laboratory, for which the High Energy Physics program has landlord responsibility. Includes equipment used in administrative functions, acquisition of additional memory, storage and channels for existing IBM 3090/180 computer, and vehicles and general purpose equipment for other programmatic activities.	Provides general purpose equipment. Includes upgrade to central computing facility.	Provides general purpose equipment. Includes upgrade to central computing facility.
	$ 4,050	$ 4,240	$ 4,450
Capital Equipment	$ 79,747	$ 84,065	$ 88,180

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY SUMMARY

HIGH ENERGY PHYSICS

I. Preface: Construction

II. A. Summary Table: Construction

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Accelerator Improvements and Modifications	$ 11,700	$ 13,838	$ 14,535	+ 5
Fermilab Linac Upgrade	0	4,634	12,000	+158
General Plant Projects	9,793	11,729	12,317	+ 5
AGS Accumulator/Booster	14,000	4,915	0	-100
Fermilab Central Computing Upgrade	3,632	0	0	0
Total, Construction	$ 39,125	$ 35,116	$ 38,852	+ 11

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Construction			
Accelerator Improvements and Modifications	Essential modifications and upgrades on an annual basis to maintain the scientific effectiveness and operating reliability and cost effectiveness of accelerators, and experimental facilities. Annual AIP expenditure less than 1% of total Federal investment in these facilities.	Level of effort increased compared to FY 1989 to allow for the modifications needed to increase the intensity and reliability of the Tevatron and especially the SLC.	Constant level of effort compared to FY 1990.
	$ 11,700	$ 13,838	$ 14,535
Fermilab Linac Upgrade	No activity.	Initiate project to upgrade the Fermilab linac injector which will increase the intensity of the extracted beam for fixed target physics and the luminosity for collider physics by 50 to 75 percent. The project includes replacing a portion of the accelerator hardware in the linac resulting in an increase in the output energy from 200 to 400 Mev. This higher energy produces a smaller beam, better injection and smaller subsequent beam losses in the booster, main ring, and Tevatron. TEC - $22,800.	Production of the copper accelerating cavities begun in FY 1990 will continue through FY 1991 and several modules of them will be moved into the Linac gallery preparatory to the final installation work in FY 1992. Most of the klystron power sources will be delivered, installed, and tested. The building and utility additions to the Linac gallery will be largely completed by the end of the fiscal year.
	$ 0	$ 4,634	$ 12,000
General Plant Projects	Essential on annual basis to maintain safety and effectiveness of general laboratory plant and support facilities.	Improved level of effort compared to FY 1989 to take into account needs of new facilities and for prompt and careful attention to a number of environmental concerns.	Constant level of effort compared to FY 1990.
	$ 9,793	$ 11,729	$ 12,817
AGS Accumulator/Booster	Complete conventional construction and major procurement and fabrication of technical systems.	Complete all construction activities.	No activity.
	$ 14,000	$ 4,915	$ 0

III. Construction (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Fermilab Central Computing Upgrade	Acquisition of large data storage system; final completion of all parts of the project.	No activity.	No activity.
	$ 3,632	$ 0	$ 0
Construction	$ 39,125	$ 35,116	$ 38,852

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DEPARTMENT OF ENERGY
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OFFICE OF ENERGY RESEARCH
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

High Energy Physics

IV. A. Construction Project Summary

Project No.	Project Title	Total Prior Year Obligations	FY 1990 Request	FY 1991 Request	Unappropriated Balance	TEC
GPE-103	General Plant Projects	$ ---	$ ---	$ 12,317	$ ---	$ 12,317
91-G-304	Accelerator Improvements and Modifications	---	---	14,535	---	14,535
90-R-104	Fermilab Linac Upgrade	---	4,634	12,000	6,166	22,800
Total, High Energy Physics Construction		$ ---	$ 4,634	$ 38,852	$ 6,166	XXX

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DEPARTMENT OF ENERGY
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OFFICE OF ENERGY RESEARCH
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

High Energy Physics

IV B. Plant Funded Construction Project

1. Project title and location: GPE-103 General Plant Projects
Various locations

Project TEC: $12,317
Start Date: 3rd Qtr. FY 1991
Completion Date: 2nd Qtr. FY 1993

2. Financial Schedule:

Fiscal Year	Appropriated	Obligations	Costs
1991	$12,317	$12,317	$ 4,300
1992	---	---	6,500
1993	---	---	1,517

3. Narrative:

(a) General Plant Projects provide for the many miscellaneous alterations, additions, modifications, replacements, and non-major construction required for general purpose, non-technical facilities at the Brookhaven National Laboratory, Fermi National Accelerator Laboratory and the Stanford Linear Accelerator Center facilities. High Energy Physics has the responsibility to provide funding for all GPP needs at BNL, Fermilab, and SLAC.

(b) These projects are required for the general maintenance, modifications and improvement of the overall laboratory plant remediation of environmental problems and include minor new construction, capital alterations and additions, and improvements to buildings and utility systems. These are short-term projects whose timely accomplishment is essential for maintaining the productivity, increasing the operational cost effectiveness, and ensuring that necessary support services are available to the research program at the DOE-owned facilities.

(c) A description and listing of the major items of work to be performed at the various locations is contained in the Construction Project Data Sheet. Some of these may be located on non-government owned property. Following is a listing of the funding proposed for the various locations:

Brookhaven National Laboratory	$ 5,742
Fermi National Accelerator Laboratory	3,845
Stanford Linear Accelerator Center	2,730
Total Estimated Cost.....	$12,317

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

High Energy Physics

IV. B. Plant Funded Construction Project

1. Project title and location: 91-G-304 Accelerator Improvements and Modifications
Various locations

Project TEC: $14,535
Start Date: 3rd Qtr. FY 1991
Completion Date: 2nd Qtr. FY 1993

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1991	$ 14,535	$ 14,535	$ 3,700
1992	---	---	5,800
1993	---	---	5,035

3. Narrative:

(a) Accelerator Improvement projects provide for a variety of minor modifications, improvements and additions to the major high energy particle accelerators, colliding beam devices and experimental facilities. Funds of this type are necessary on an annual basis to maintain and improve the scientific effectiveness of these facilities as well as their operating reliability and cost effectiveness. The funds requested, which represent less than 1 percent of the present value of the government's investment in these facilities, produce a substantial return in terms of more cost effective operation and greater research productivity.

(b) These projects are essential on an annual basis to maintain the short term operating efficiency and reliability, and the research flexibility of the high energy accelerators, colliding beam systems and related experimental facilities, thereby maintaining or enhancing their level of scientific effectiveness and productivity.

(c) A description and listing of the the major items of work to he performed at the various locations is contained in the Construction Project Data Sheet. Some of these may be located on non-government owned property. Following is a listing of the funding proposed for the various locations:

Brookhaven National Laboratory	$ 2,875
Fermi National Accelerator Laboratory	7,300
Stanford Linear Accelerator Center	4,360
Total Estimated Cost.....	$14,535

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DEPARTMENT OF ENERGY
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OFFICE OF ENERGY RESEARCH
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

High Energy Physics

IV. B Plant Funded Construction Project

1. Project title and location: 90-R-104 Fermilab Linac Upgrade
Batavia, Illinois

Project TEC: $22,800
Start Date: 1st Qtr. FY 1990
Completion Date: 2nd Qtr. 1993

2. Financial schedule

Fiscal Year	Appropriations	Obligations	Costs
1990	$ 4,634	$ 4,634	$ 2,500
1991	12,000	12,000	8,000
1992	6,166	6,166	7,400
1993	-	-	4,900

3. Narrative:

(a) Purpose of this project is to increase intensity of extracted beam for the fixed target physics program and luminosity for the collider physics program by approximately 50 percent.

(b) This is achieved by doubling the injection energy from the Linac into the booster to 400 MeV in order to reduce the size of the beam bunch. This in turn reduces subsequent beam losses in the booster, main ring, and Tevatron.

(c) This project replaces the downstream half of the Linac drift tube accelerating cavities and their obsolete power tubes with new cavities and modern klystron power supplies.

4. Total Project Funding (BA):

	Prior Years	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 4,634	$12,000	$ 6,166
Capital Equipment	150	100	100	50
Operating Expenses	2,470	2,100	800	1,410

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH

OVERVIEW

SUPERCONDUCTING SUPER COLLIDER (SSC)

Research in high energy physics is directed at understanding the nature of matter and energy at the most fundamental level and the basic forces which govern all processes in nature. Experimental research in high energy physics most often requires the use of large particle accelerators, colliding beam devices, and large particle detectors. The ability to carry out forefront exploratory research on the physics frontier is critically dependent on the experimental capabilities of the accelerators, colliding beam and detector facilities. The Stanford Linear Collider (SLC) and the Fermilab Tevatron, together with the other high energy physics facilities, will keep the U.S. program highly competitive and at the cutting edge for the next several years.

Although the present model for understanding the subnuclear world has been very successful, we know that it is not complete and cannot provide answers to a number of very fundamental questions. After extensive studies and careful review it has been determined that exploration of the Tev mass region is essential to advance understanding of the fundamental nature of matter and energy and to enable the U.S. High Energy Physics program to remain at the research frontier in the late 1990's and beyond. To explore this region a new, more powerful particle accelerator is required. The SSC is a proton-proton collider having an energy of up to 20 Tev per beam that will permit exploration of this new domain of physics research which cannot be reached by any facility either in existence or planned. The SSC holds the potential for new breakthroughs in science, technology and education. While the primary purpose of the SSC is to provide new fundamental knowledge and insights, history has clearly demonstrated that major advances in fundamental understanding lead subsequently to developments in technology and practical products which profoundly affect the quality of life for all Americans and enhance the economic competitiveness of our nation.

The design of the SSC is based firmly on principles and engineering concepts used in previous accelerators. It is backed by a thorough conceptual design report and cost estimate which have been carefully reviewed by the Department and by outside experts, by an R&D program specifically related to the SSC which began in FY 1984, by prior efforts in the High Energy Physics program to develop accelerator quality superconducting magnets and by the experience gained in the successful operation of the Tevatron. In January 1989, the Department selected the site for the SSC and awarded a contract to Universities Research Association, Inc., to serve as the Management and Operating

Contractor for the SSC. A revised conceptual design is being prepared to reflect the characteristics of the Texas site and R&D achievements since 1986. This will form the basis for establishing technical, cost and schedule baselines for the SSC. These baselines will be validated by DOE early in 1990 and form the basis for revised project estimates.

The SSC is a critical part of the Administration's initiative to strengthen the position of the nation as a world leader in science and technology. It will be both a symbol of the nation's commitment to scientific leadership in this century and the next, and an instrument by which U.S. leadership can be maintained. It will produce discoveries, innovations and spin-offs that could profoundly touch every American.

Significant funding for R&D ($89,578,000) and initial Federal construction funding for the SSC ($128,992,000) was appropriated in FY 1990. Major R&D achievements are expected in FY 1990, including further progress on refining and optimizing the design of the superconducting magnets, major effort on Phase II of the magnet industrialization program and design of the injectors and other SSC technical systems. The initial construction funding in FY 1990 will permit establishment of an effective SSC laboratory team, detailed design work on technical systems and conventional facilities, site preparation, long lead technical component procurements and construction of initial on-site support structures. The State of Texas has indicated that it would contribute about $80,000,000 in FY 1990. A detailed agreement on the Texas contribution has not been reached.

The request for FY 1991 includes $116,000,000 in operating funds for continued R&D on accelerator systems and detectors; $33,000,000 in capital equipment for laboratory computing equipment, scientific instrumentation, laboratory support equipment which are essential ingredients for establishing a new research laboratory and for detector prototype fabrication; and $168,866,000 for construction to support continued detailed design, the magnet industrialization program, procurement of technical systems components, on-site construction, and project management activities. In addition, significant construction of on-site facilities and other SSC systems is expected with funds contributed by the State of Texas.

The Department and the SSC Laboratory are in the process of developing a revised project conceptual design along with cost estimate and schedule. This is a rapidly evolving situation and appropriate revisions will be incorporated into the budget request and outyear plans after the new technical, cost and schedule baselines have been validated.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
OFFICE OF ENERGY RESEARCH
(dollars in thousands)
LEAD TABLE
Superconducting Super Collider (SSC)

Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Base	FY 1991 Request	Program Change Request vs Base	
					Dollar	Percent
Operating Expenses.....	$82,107	$68,872	$73,740	$116,000	$+ 42,260	+ 57%
Capital Equipment.....	16,000	20,706	20,706	33,000	+ 12,294	+ 59%
Construction.....	0	128,992	128,992	168,866	+ 39,874	+ 31%
Total.....	$98,107	$218,570	$223,438	$317,866	+ 94,428	+ 42%
Operating Expenses.....	(82,107)a/	(68,872)a/	(73,740)	(116,000)	$+ 42,260	+ 57%
Capital Equipment.....	(16,000)	(20,706)	(20,706)	(33,000)	+ 12,294	+ 59%
Construction.....	0	(128,992)	(128,992)	(168,866)	+ 39,874	+ 31%
Total Program.....	($98,107)b/	($218,570)c/d/e/f/	($223,438)	($317,866)c/	+ 94,428	+ 42%
Staffing (FTEs).....	10	40 g/	40	52		

Authorization: Section 209, P.L. 95-91.

a/ Includes $522,000 in FY 1989; and $838,000 in FY 1990 General Science Program Direction support.
b/ Excludes $1,387,000 which represents applicable portion of $12,000,000 General Reduction contained in FY 1989 appropriation.
c/ Includes funding provided through appropriation process only. Non-federal contributions will permit additional activities. The size and scope of these contributions will be known after firm agreements with the State of Texas and foreign contributors are completed.
d/ Does not reflect proposed reprogramming of $3,755,000 to General Science Program Direction for revised request for an additional 30 FTE's.
e/ Excludes $4,176,000 which represents applicable portion of $21,000,000 General Reduction contained in FY 1990 Appropriation.
f/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.
g/ Revised Request.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

SUMMARY OF CHANGES

Superconducting Super Colllider (SSC)

FY 1990 Appropriation	$ 218,570
Adjustments - Increased personnel costs	+ 4,868
FY 1991 Base	$ 223,438
SSC R&D	
- Enhanced level of R&D to complete design of superconducting magnets and to develop designs for other technical systems	+ 42,260
Capital Equipment	
- Equipment in support of SSC accelerator and detector R&D programs and for general purpose equipment essential to set up a new laboratory	+ 12,294
Construction	
- Enhanced level of SSC construction	+ 39,874
FY 1991 Congressional Budget Request	$ 317,866

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY SUMMARY

SUPERCONDUCTING SUPER COLLIDER (SSC)

I. Preface: SSC R&D

In FY 1988 and prior years the SSC R&D program focused heavily on superconducting magnets which are a large and critical element of the SSC. In FY 1990 substantial magnet R&D will continue and a significant level of activity related to other technical systems will be initiated. In FY 1991 a continued significant level in SSC R&D is required to optimize the design of the superconducting dipole magnets, to continue R&D aspects of the program of industrialization for magnet fabrication, to advance the conceptual design of the injector, quadrupole and correction magnets, and other technical systems (such as refrigeration, vacuum and controls), to provide technical input for refining the design of conventional facilities, and to proceed with detector R&D for specific SSC detectors.

II. A. Summary Table: SSC R&D

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
SSC R&D	$ 81,585	$ 68,034	$ 110,300	+ 62
Total, SSC R&D	$ 81,585	$ 68,034	$ 110,300	+ 62

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1988	FY 1990	FY 1991
SSC R&D	The goal of the SSC R&D program is to insure that designs of technical systems and components meet the necessary quality and reliability standards and to demonstrate this by fabrication of prototypes and testing of components. The R&D program in FY 1988 will provide critical technical input into establishing the collider footprint on the site and establishing the technical, cost and schedule baselines for the SSC. The new SSC laboratory team is conducting a thorough reevaluation of all technical systems with particular attention to magnet design and injector system parameters. The superconducting magnet R&D program includes: further fabrication and testing of full-scale dipoles of advanced design; completion of Phase I of the magnet industrialization program; preparation for Phase II of the magnet industrialization program; and prototyping and testing of quadrupoles. Also underway are accelerator physics studies, preparation of the supplemental EIS and the SSC detector development program.	The FY 1990 program will continue to have a strong focus on the long superconducting dipole magnets, with the fabrication and testing of about a dozen long magnets built in the HEP laboratories to optimize the design and initiation of Phase II of the magnet industrialization program ($45,000); design, prototyping and testing on other collider technical systems, including the focusing and correction magnets, RF, vacuum, etc. ($9,500); designs for the four injector accelerators ($3,500); technical input for conventional system development ($1,000); and, a significant program of detector R&D as this program moves from generic R&D to a program which includes both generic R&D and R&D on specific SSC detectors ($8,541). Implementation plans for the Energy Sciences Network project, identified in the Applied Mathematical Sciences subprogram of the Basic Energy Sciences program, will proceed. The SSC program's share for the implementation of ESNET is $493.	The FY 1991 program will continue: to have a strong focus on dipole magnet R&D to finalize dipole design for the pre-production magnets and to support the transition to industrial fabrication of pre-production magnets in FY 1992 ($32,000); to finalize designs of the injectors and other collider technical systems ($16,000); to support a major enhancement in detector R&D as specific detector designs evolve ($32,000); to support general laboratory operations ($15,300); and to provide physics program support ($15,000). Upgrades of ESNET to conform to the National Research and Education standards will continue to be pursued and will be shared among ER programs that benefit from ESNET.
	$ 81,585	$ 68,034	$ 110,300
SSC R&D	$ 81,585	$ 68,034	$ 110,300

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY SUMMARY

SUPERCONDUCTING SUPER COLLIDER (SSC)

I. Preface: Program Direction

This subprogram provides the Federal staffing resources and associated funding required to plan, direct, and administer a highly complex program to plan, design, construct, and operate the multibillion dollar SSC. The initial stages of the creation of the SSC have required substantial and extraordinary staff effort in areas such as: technical and management direction of the R&D program; establishment of research policies and formulation of long-range plans and budgets; conduct of site selection activities; development of environmental impact statements; responding to public inquiries; and planning for creation of a new laboratory. Other activities with rapidly increasing needs for staff include the securing and management of agreements with the State of Texas and foreign contributors. The magnitude and complexity of the project resulted in elevation of management direction from a Division level in the Office of High Energy and Nuclear Physics to the recently formed Office of Superconducting Super Collider (OSSC) which reports directly to the Director of Energy Research. An SSC Project Office (SSCPO) at the SSC site in Texas is also being established. Implementation of the SSC Management Plan will result in substantial additional staffing requirements to manage effectively all aspects of the SSC project.

II. A. Summary Table: Program Direction

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Program Direction	$ 522	$ 838	$ 5,700	+580
Total, Program Direction	$ 522	$ 838	$ 5,700	+580

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Program Direction	Provided funds for salaries, benefits, and travel for ten full-time equivalents (FTE's) in the Office of Superconducting Super Collider (OSSC). ($509)	Provide funds for salaries, benefits, and travel for ten FTE's for OSSC included in the FY 1990 budget, including normal increased personnel costs. A revised request for an additional 30 FTE's required to implement the SSC Management Plan is discussed below. ($788)	Provide funds for salaries, benefits, and travel for 52 FTE's required in the OSSC to implement the SSC Management Plan. Provide for an additional 42 FTE's over the FY 1990 budget and 12 over the revised FY 1990 level of effort. Provide for normal increased personnel costs resulting, for example, from within-grade and merit increases and the impact of the FY 1990 general and executive pay raises. ($4,760)
	The OSSC-HQ managed the many technical, project management, and administrative tasks and extensive Congressional, state and local, and public interface activities associated with the SSC. Analyzed technical designs and cost estimates resulting from the advanced technology R&D effort and sought to increase international collaboration and non-Federal cost-sharing in this new accelerator facility. Provided oversight of an extensive industrialization program for magnet R&D and technology transfer. Prepared extensive program documentation, prepared briefings and budget justifications, and conducted reviews. Provided technical support to the SSC Site Task Force (STF) and handled residual site selection issues.	Provide 25 FTE's for the OSSC-HQ, an additional 15 FTE's over the FY 1990 budget. This staff provides program direction and management oversight of the DOE SSC program totaling $219 million as well as the non-Federal funding contributions. R&D will focus on magnet industrialization, detectors, engineering and fabrication of injectors, accelerator R&D, physics, and theoretical analyses. External relations will increase, particularly with Texas regarding land acquisition and funding contributions. State and international agreements for cost-sharing arrangements will be negotiated. Site specific activities will increase, and construction activities will begin. Workload related to project management plans, briefings, reviews, and documentation will continue to be heavy. OSSC-HQ staff has primary responsibility for project control activities as well as policy and technical direction to the SSCPO.	Provide 28 FTE's for staffing the OSSC-HQ to manage a $318 million DOE SSC program and additional non-Federal contributions. Additional funding will support an additional 18 FTE's over the FY 1990 budget, including 15 which are also required in FY 1990. Significant staff time will be expended on negotiation and implementation of cost-sharing arrangements with Texas and foreign countries. Continue to manage the expanded scientific R&D program and provide guidance and oversight from HQ on detailed design and civil construction activities. Manage project control at the HQ level and meet the heavy demand for project reviews, briefings and information requests from the Congress, public and media. Provide ES&H, legal, and administrative support to ensure safe and efficient project management.

III. Program Direction (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Program Direction (Cont'd)	Provided initial support at the site through temporary employee details.	Provide 15 FTE's for staffing the SSCPO. Provide technical guidance and support activities at the site, with the State of Texas, and with the M&O contractor. Provide guidance and direction on the scientific program and monitor technical progress, provide engineering and construction support, maintain project control at the field level, and ensure ES&H and quality assurance control and compliance. Provide OSSC-HQ assistance as required.	Provide 24 FTE's to staff the SSCPO. Provide project direction and guidance and oversee civil construction activities including site preparation, campus buildings, and injector facilities. Oversee development of technical systems such as the collider dipole magnets. Interact daily with M&O contractor staff and State of Texas representatives. Assist OSSC-HQ as required.
	Provided a variety of program support such as printing and binding, supplies and materials, and contractual services. ($13)	Provide a variety of program support similar to FY 1989. Also provide for support costs of Automated Office Support System workstations at HQ. ($50)	Provide for a variety of program support as in FY 1989 and FY 1990 at an increased level to support the additional staff. Also provide for rents at the site, employee relocations, and other services at the SSCPO. ($940)
	$ 522	$ 838	$ 5,700
Program Direction	$ 522	$ 838	$ 5,700

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY SUMMARY

SUPERCONDUCTING SUPER COLLIDER (SSC)

I. Preface: SSC Capital Equipment

In FY 1991, the SSC will have significant capital equipment requirements for procurements in support of R&D efforts and for initial procurement of detector components and systems. Also included are the equipment needs for establishing a major new research laboratory, including in-house computing capability, acquisition of general purpose scientific instrumentation and general laboratory support equipment.

II. A. Summary Table: SSC Capital Equipment

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
SSC Capital Equipment	$ 16,000	$ 20,706	$ 33,000	+ 59
Total, SSC Capital Equipment	$ 16,000	$ 20,706	$ 33,000	+ 59

II. B. Major Laboratory and Facility Funding

Superconducting Super Collider Laboratory	$ 16,000	$ 20,706	$ 33,000	+ 59

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
SSC Capital Equipment	Equipment in support of R&D programs such as tooling; general laboratory equipment such as power supply systems, test, control and measurement equipment; and components for detector development and prototyping.	Provides capital equipment in support of the SSC R&D program, including prototyping the many technical systems and components of the collider and its four injector accelerators; power supplies, test and control instrumentation; computing equipment, and components for the magnet test facility near the site. Also provides for extensive prototypes of detector components.	Provides capital equipment for detector systems and component prototypes ($15,000); for the magnet R&D program including the on-site magnet development facility ($8,000); and for the accelerator R&D efforts on other technical systems ($3,000). Also provides equipment that is crucial for establishing a major new research laboratory. Funds will provide for establishing in-house computing capability ($5,000); general laboratory equipment such as standardized electronics, vacuum pumps, instrumentation, and power supplies, shop tools, vehicles and office machines ($2,000).
	$ 16,000	$ 20,706	$ 33,000
SSC Capital Equipment	$ 16,000	$ 20,706	$ 33,000

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY SUMMARY

SUPERCONDUCTING SUPER COLLIDER (SSC)

I. Preface: Construction

II. A. Summary Table: Construction

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Construction	$ 0	$ 128,992	$ 168,866	+ 31
Total, Construction	$ 0	$ 128,992	$ 168,866	+ 31

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Construction	No activity.	Provides initial construction funding for the SSC. Permits significant progress in detailed design of technical components and conventional facilities, selected long lead procurements for the injectors and for collider magnets, site preparation and the contracts for the first on-site buildings. TEC - $4,300,000. ($128,992)	Provides for detailed design of technical systems ($33,000); detailed design of conventional facilities ($18,000); injector system fabrication ($20,000); collider system fabrication, including support of the magnet industrialization program ($48,000); project management and support ($35,000); and site preparation, utilities and on-site structures ($14,866). The amounts indicated are the current estimates in a rapidly evolving situation. Appropriate revisions to the FY 1991 request and overall project plan will be made after the new technical, cost and schedule baselines are validated.

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III. Construction (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Construction (Cont'd)		In addition to the construction activities to be conducted with Federal funds, it is anticipated that there will be contributions from the State of Texas to finance construction activities including campus buildings, on-site support buildings, experimental halls, other SSC systems and R&D programs. The State of Texas has indicated that it would contribute 40 percent of the amount of Federal funds appropriated in FY 1990. On this basis, a substantial Texas contribution of about $120,000,000 is also expected in FY 1991. Initial contributions from foreign participants may become available in FY 1991. This is subject to completion of negotiations with the State of Texas and foreign contributors.	In addition to the construction activities to be conducted with Federal funds, it is anticipated that there will be contributions from the State of Texas to finance construction activities including campus buildings, on-site support buildings, experimental halls, other SSC systems and R&D programs. The State of Texas has indicated that it would contribute 40 percent of the amount of Federal funds appropriated in FY 1990. On this basis, a substantial Texas contribution of about $120,000,000 is also expected in FY 1991. Initial contributions from foreign participants may become available in FY 1991. This is subject to completion of negotiations with the State of Texas and foreign contributors.
	$ 0	$ 128,992	$ 168,866
Construction	$ 0	$ 128,992	$ 168,866

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Superconducting Super Collider

IV. A. Construction Project Summary

Project No.	Project Title	Total Prior Year Obligations	FY 1990 Request	FY 1991 Request	Unappropriated Balance	TEC
90-R-106	Superconducting Super Collider	$ 0	$ 208,992	$ 368,866	$ 3,722,142	$4,300,000
	Less Non-Federal Contributions	0	(80,000)	(200,000)	(1,520,000)	XXX
Total, Superconducting Super Collider Construction		$ 0	$ 128,992	$ 168,866	$ 2,202,142	XXX

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Superconducting Super Collider (SSC)

IV. B. Plant Funded Construction Project

1. Project title and location: 90-R-106
Superconducting Super Collider (SSC)
Ellis County, Texas

Project TEC: $ 4,300,000[a/]
Start Date: 1st Qtr. FY 1990
Completion Date: 2nd Qtr. FY 1998

2. Financial schedule:

Fiscal Year	Appropriated[b/]	Obligations	Costs
1990	208,992	208,992	125,000
1991	368,866	368,866	300,000
1992	625,000	625,000	600,000
1993	673,000	673,000	650,000
1994	669,000	669,000	650,000
1995	641,000	641,000	640,000
1996	641,000	641,000	610,000
1997	473,142	473,142	490,000
1998	0	0	205,000

3. Narrative:

- The Superconducting Super Collider is a high luminosity proton-proton collider with beam energy of up to 20 trillion electron volts (TeV). The collider itself consists of two rings of superconducting magnets and associated systems in a common tunnel, about 53 miles in circumference. Up to six interaction regions will be outfitted with collision halls and support areas for experiments. The project includes a series of injector accelerators which provide the input beam for acceleration and circulation in the collider rings. The associated office and laboratory facilities (buildings, structures, and utilities) required to support the technical systems are also included. The TEC is the full construction cost and does not take into account any anticipated international or state contributions and assumes that the site will be provided at no cost to DOE. This estimate was verified by independent experts. The new technical, cost and schedule baselines may lead to revisions in the cost estimate.

1991

- The SSC will ensure forefront experimental capability for continued progress in advancing the frontier of knowledge of matter and energy at its most fundamental level, with resulting impacts on the Nation's science and technology base. The collider will cause oppositely directed bunches of protons to collide, basically head-on, making available a total of up to 40 TeV of energy within an extremely small volume. These energies are expected to produce new types of matter and new forms of energy. Internal structure, and even more basic building blocks of matter, may be revealed. Large detectors will be used in the interaction regions to detect and record interactions of interest. The SSC, through its investigation of fundamental physical processes, will provide new insights into questions of great significance to other sciences as well as high energy physics, and to our knowledge and understanding of the world in which we live. It will be a powerful and unique tool for extending those investigations of matter and energy that have led us to an understanding of the atom, the nucleus, and on to their smallest components.

- Construction activities will proceed on a broad front in FY 1991. The request for appropriated funds includes $33 million for detailed design of technical systems, $18 million for conventional facilities design, $15 million for site preparation, utilities and on-site structures, $20 million for injector system fabrication, $48 million for collider system fabrication (largely in support of the magnet industrialization program and magnet material procurements), and $35 million for project management, support equipment, and rental space. No tunneling construction is expected to occur until a decision has been made to go to commercial production of the superconducting magnets.

- The outyear BA projections for the project including construction, detectors, R&D, and preoperations costs, in escalated dollars are:

(Dollars in Millions)

	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	Total
Total Project Funding	$ 33.0	$ 97.6	$297.7	$512.2	$759.0	$803.0	$788.0	$837.0	$897.8	$748.3	$120.0	$5,893.6 a/b/c/
Estimated Non-Federal Contributions	0	0	80.0	200.0	200.0	300.0	300.0	300.0	300.0	120.0	0	1,800.0
Federal Share	$ 33.0	$ 97.6	$217.7	$312.2	$559.0	$503.0	$488.0	$537.0	$597.8	$628.3	$120.0	$4,093.6

a/ The technical basis of the cost estimate is the 1986 Conceptual Design Report. The Department and the SSC Laboratory are in the process of developing a revised conceptual design along with cost estimate and schedule. This is a rapidly evolving situation and appropriate revisions will be incorporated into the budget request and outyear plans after the new technical, cost and schedule baselines have been validated.

b/ Total project funding indicated. Funding required through appropriation process will be less as a result of anticipated non-federal contributions presently estimated to total $1.8 billion. The projection of a total non-federal contribution to the SSC of $1.8 billion and the year-by-year spread of the estimated contributions are preliminary estimates. The exact funding type and timing of the non-Federal contributions will depend on which SSC systems are provided by others and how these systems fit into the project schedule. Improved firm estimates will be available after completion of definitive cost-sharing agreements with the State of Texas and foreign contributors.

g/ Excludes direct federal management and on-site administrative costs shown below:

	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995
Program Direction.....	$ 522	$ 838	$ 5,700	$11,300	$12,600	$12,800	$13,100
FTE's.....	12	40	52	106	124	124	124

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction.....	$ 0	$ 0	$128,992	$168,866	$2,202,142
Operating Expenses & Capital Equipment.....	33,000	97,585	88,740	143,300	1,230,960

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH

OVERVIEW

NUCLEAR PHYSICS PROGRAM

The Nuclear Physics program of the Department of Energy (DOE) has the lead responsibility for Federal support of nuclear physics research and supports basic research activities under the mandate provided in Public Law 95-91 which established the Department. The primary goal of the program is to understand the structure of atomic nuclei and the fundamental forces required to hold nuclei together. Nuclear processes determine the essential physical characteristics of our universe and the composition of the matter which forms it. The science of nuclear physics has spawned many diverse technologies such as nuclear medicine, nuclear power, nuclear fusion and nuclear weapons. These technologies have matured to the point where they now operate almost independently of the basic research program. Nevertheless, vital interactions still occur in the development of advanced concepts, in the transfer of improved theoretical models, in the common development of instrumentation, and in the need for more precise nuclear physics data in selected areas. Nuclear Physics accelerators uniquely generate many of the radioisotopes used for medical diagnoses and support several cooperative programs in biomedical research. About 75 percent of the 80 new Ph.D.'s produced each year in the DOE Nuclear Physics program will find careers in these associated areas. In addition, the Nuclear Data program within nuclear physics generates, evaluates, and disseminates information such as neutron cross sections in active support and collaboration with these programs.

A specific example of the diverse and active cooperation between nuclear scientists and other disciplines can be seen in the area of activation analysis. This nondestructive nuclear technique uses small neutron generators to identify in detail the composition of complex materials. For example, the origin of the clays found in archeological potsherds can be specified to individual mine sites. One use of this method was to identify the homeland of the Biblical Philistines as being on the island of Cyprus. The ongoing use of neutron activation is crucial in oil exploration well logging to identify the substances through which a test bore passes. Nuclear scientists were central to the discovery of iridium at the K-T boundary between the cretaceous and tertiary geological eras, of 66 million years ago. The presence of iridium implies that a large meteorite impacted the earth, leading to major climatic changes and causing the extinction of the dinosaurs. Use of this technique for trace element impurity identification is showing great promise to greatly improve the burning of coal in a clean way. And finally, nuclear physicists active in heavy ion research have used their talents to help perfect a process in which activation analysis is used to specifically identify plastic explosives in attempts to smuggle them aboard aircraft in the luggage of terrorists.

Nevertheless, the major activity and essential vitality of the field focuses upon an ever improving fundamental understanding of the material and forces of nature. Over the years, many theoretical models have been developed to describe the structure of the nucleus and its behavior. These models have progressed from simple mechanical models of surface vibrations and rotations to sophisticated descriptions of meson-nucleon interactions. Scientists now know that nucleons (neutrons and protons, the constituents of the nucleus), are composed of smaller constituents called quarks. Based on the ways quarks are confined together in groups of three to make nucleons, or groups of two to make mesons, a more fundamental theory of the nuclear force called quantum chromodynamics (QCD) is emerging. The incorporation of QCD concepts deepens our understanding of nuclear structure and interactions and provides significant new challenges to the experimental program. Many of the characteristics and implications of the new QCD formulation of the nuclear force are addressed by the research programs both of nuclear physics and its daughter science, high energy physics. However, the Nuclear Physics program uniquely approaches the problems by testing the theoretical predictions in the medium of extended nuclear matter provided by nuclei composed of many nucleons. A growing number of problems of mutual interest to nuclear physics and astrophysics include measurements or calculations of supernovae, neutron stars, solar neutrinos, heavy cosmic rays, and the continuing problem of stellar nuclear abundances. Of particular interest is the ability of relativistic heavy ion collisions to create a quark-gluon plasma, simulating a stage of evolution of the universe that ended ten millionths of a second after the initial "big bang."

The strategy of the program is to address the most pressing scientific questions in nuclear physics with new theories, equipment and facilities while maintaining an effective balance between competing and diverse program elements. Essential guidance is provided by the Nuclear Physics Program plan, with continuing advice from the Nuclear Science Advisory Committee (NSAC). Key elements of the plan are reflected in this budget.

The program is centered around an active experimental research program which is continually evaluated and revised to focus on the most basic scientific questions. Necessary for proper conduct of this research are efforts in nuclear theory, design and fabrication of sophisticated detectors and the development and training of creative and skilled personnel. Central to the program are the construction, operation and maintenance of the accelerator facilities which provide the beams of particles upon which the experiments are based. In some areas of nuclear physics, questions are addressed at universities by accelerators dedicated to in-house research, or smaller facilities at some national laboratories. However, many of the newly emerging fundamental problems in nuclear science require large modern facilities designed for the research use of the entire nuclear community.

The DOE Nuclear Physics program supports over 80 percent of the U.S. program of basic research in nuclear physics. In FY 1991 it will maintain a vigorous research program, focusing on current problems of high scientific and technological interest and pointing towards exploitation of the new major facilities. A growing fraction, now about 75 percent, of the scientists supported by the Nuclear Physics program plan experiments and conduct research at the large user dedicated facilities. The strong university component which forms the central core of the facility user activity is augmented by a NSF effort of comparable

size. About 110 visiting scientists do experiments at the Bevalac at the Lawrence Berkeley Laboratory each year and a similar number make use of the Tandem/AGS at the Brookhaven National Laboratory. About 320 visiting scientists annually use the multiple beams available at the LAMPF facility at the Los Alamos National Laboratory for one or more experiments. Already, 245 physicists from 60 institutions have submitted 47 research proposals to the Continuous Electron Beam Accelerator Facility (CEBAF). From these proposals a program of experiments will ultimately be selected to be carried out when the facility goes into operation with present focus on the involvement of the user community on equipment fabrication. About 200 scientists from outside of CEBAF are already actively participating in the design of experiments. Special emphasis is placed on effective use of the upgraded accelerators at the University of Washington and Yale University, the ATLAS superconducting heavy ion facility at Argonne National Laboratory (ANL), and Tandem/AGS high energy heavy ion beams at Brookhaven National Laboratory (BNL). Adjustments within the program will be made to accommodate the increased interest of students and postdoctoral fellows in nuclear physics, to enhance the theory component, and to reflect more accurately the highest program priorities and new scientific areas. In addition, much good science can be accomplished with selected smaller improvements of existing facilities such as the South Hall Ring experiment at the MIT/Bates Electron Linac. Other National laboratory and university accelerators will be operated for maximum program effectiveness with selected capital equipment detector projects to optimize facility productivity. Among these are a start of the segmented gamma ray detector for nuclear structure physics (Gammasphere) and joint participation with Canada and the United Kingdom in the Sudbury Neutrino Observatory (SNO) project.

Research and development in support of the next generation accelerators is included in the Nuclear Physics program. Efforts will continue at Brookhaven National Laboratory for the purpose of extending the solid scientific and technical basis for the proposed Relativistic Heavy Ion Collider (RHIC). The R&D necessary to optimize the RHIC project is currently being conducted. The Nuclear Science Advisory Committee (NSAC) has assigned RHIC its highest priority for start of new construction in its Long Range Plan for Nuclear Science of 1983. That priority was endorsed by the National Research Council in its report "Physics through the 1990's." In addition to the core program of quark-gluon plasma investigations, the intense electric and magnetic fields produced in these collisions provide a new mechanism for production of non-strongly interacting particles. $15,000,000 is being requested to start construction of RHIC. NSAC has recently completed its latest long range plan "Nuclei, Nucleons, Quarks - Nuclear Science in the 1990's." It states: "We strongly reaffirm the very high scientific importance of the Relativistic Heavy Ion Collider (RHIC). Since the last long range plan (LRP), theoretical progress has strengthened the case for the existence of a quark-gluon plasma, and recent experiments demonstrate that conditions favorable to its formation will be attained. RHIC will provide unprecedented opportunities to produce and study ultradense matter. Therefore, we strongly endorse the recommendation of the 1983 LRP and subsequent NSAC deliberations that RHIC has the highest priority for new construction in the nuclear physics program. We urge a swift beginning for this important project."

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF ENERGY RESEARCH
(dollars in thousands)
LEAD TABLE
Nuclear Physics

Activity	FY 1989 Appropriated	FY 1990 Request	FY 1991 Base	FY 1991 Request	Program Change Request vs Base	
					Dollar	Percent
Operating Expenses						
Medium Energy Nuclear Physics	$85,191	$92,388	$92,388	$101,000	$+ 8,612	+ 9%
Heavy Ion Nuclear Physics	66,476	67,516	67,516	72,929	+ 5,413	+ 8%
Low Energy Nuclear Physics	24,461	26,326	26,326	28,100	+ 1,774	+ 7%
Nuclear Theory	10,818	12,226	12,226	13,500	+ 1,274	+ 10%
Capital Equipment	18,500	19,720	19,720	26,700	+ 6,980	+ 35%
Construction	52,500	71,485	71,485	88,500	+ 17,015	+ 24%
Total	257,946	289,661	289,661	330,729	+ 41,068	+ 14%
Operating Expenses	(186,946)a/	(198,456)	(198,456)	(215,529)	+ 17,073	+ 9%
Capital Equipment	(18,500)	(19,720)	(19,720)	(26,700)	+ 6,980	+ 35%
Construction	(52,500)	(71,485)	(71,485)	(88,500)	+ 17,015	+ 24%
Total Program	($257,946)b/c/	($289,661)c/d/e/	($289,661)	($330,729)c/	$+ 41,068	+ 14%
Staffing (FTEs)	(Reference General Science Program Direction)					

Authorization: Section 209, P.L. 95-91.

a/ Total has been reduced by $2,365,000 ($520,000 Medium Energy; $440,000 Heavy Ion; $1,405,000 Low Energy) reprogrammed to Energy Supply for SBIR.
b/ Excludes $3,188,000 which represents applicable portion of $12,000,000 General Reduction contained in FY 1989 Appropriation.
c/ Reflects comparability adjustment for new Environmental Restoration and Waste Management program as follows: FY 1989 - $601,000; FY 1990 - $939,000; FY 1991 - $1,202,000.
d/ Excludes $5,573,000 which represents applicable portion of $21,000,000 General Reduction contained in FY 1990 Appropriation.
e/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

SUMMARY OF CHANGES

Nuclear Physics

FY 1990 Appropriation	$289,661
Adjustments - Increased personnel costs	0
FY 1991 Base	289,661
- Funding required to maintain a constant overall level of program activity	+ 9,536
Medium Energy Nuclear Physics	
- Conduct medium energy physics research and operations at about constant level of activity, with increased level of support for CEBAF laboratory	+ 4,631
Heavy Ion Nuclear Physics	
- Continue Heavy Ion operations with increased activity in university programs and at the AGS at Brookhaven	+ 2,678
Low Energy Nuclear Physics	
- Continue nuclear data program and low energy physics operations and research at approximately constant level of activity with additional support for neutrino research	+ 668
Nuclear Theory	
- Increase level of activity with emphasis on preparation of theoretical guidance for experimental results using new theory institute	+ 761

Capital Equipment

- Provide for initiation of Gammasphere and Sudbury Neutrino Observatory, maintain overall level of instrumentation effort and provide for general purpose equipment to meet laboratory-wide needs of Lawrence Berkeley Laboratory	+ 6,152

Construction

- Slightly reduced level of effort for AIP and GPP	- 747
- Contine Continuous Electron Beam Accelerator Facility (CEBAF) project at planned level	+ 2,389
- Initiate Relativistic Heavy Ion Collider (RHIC) construction project	+ 15,000
FY 1991 Congressional Budget Request	$330,729

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR PHYSICS

I. Preface: Medium Energy Nuclear Physics

The Nuclear Physics program supports the basic research necessary to identify and understand the fundamental features of atomic nuclei and their interactions. The Medium Energy Nuclear Physics subprogram supports operations and research at accelerator facilities with sufficient primary beam energy to produce pi mesons (pions) using projectiles no more massive than alpha particles. In addition, the subprogram supports nuclear physics experiments at accelerators operated by other DOE programs (e.g., High Energy Physics and Basic Energy Sciences) and at other unique domestic or foreign facilities. Two national accelerator facilities are operated entirely under the Medium Energy subprogram--the Clinton P. Anderson Meson Physics Facility (LAMPF) at Los Alamos National Laboratory and the Bates Linear Accelerator Center operated by the Massachusetts Institute of Technology. These accelerator facilities serve a nationwide community of scientists from over 100 American institutions, of which over 90% are universities. At proton facilities, support is provided for wide-ranging research activities on the scattering of protons and pions, weak interactions, muonic and pionic atoms, selective excitation of proton/neutron states, and giant resonances. At electron facilities, support is provided for high resolution studies of the electric and magnetic structure of nuclei, the motion of pions inside nuclei, and the role of excited states of nucleons in nuclear structure. R&D activities required for the construction of the Continuous Electron Beam Accelerator Facility (CEBAF) and preparation for operation of the laboratory are also carried out under the Medium Energy subprogram.

II. A. Summary Table: Medium Energy Nuclear Physics

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Research				
LAMPF-Based Research	$ 10,456	$ 10,911	$ 10,921	0
Bates Based Research	3,107	3,282	3,291	0
CEBAF-Based Research	8,922	11,284	12,209	+ 8
Research at Other Sites	11,041	12,188	12,379	+ 2
Subtotal, Research	$ 33,526	$ 37,665	$ 38,800	+ 3
Operations				
LAMPF Operations	$ 41,580	$ 40,426	$ 41,000	+ 1
Bates Operations	6,850	7,000	7,400	+ 6
CEBAF Operations	1,000	6,015	12,400	+106
Other Operations	2,235	1,282	1,400	+ 9
Subtotal, Operations	$ 51,665	$ 54,723	$ 62,200	+ 14
Total, Medium Energy Nuclear Physics	$ 85,191	$ 92,388	$ 101,000	+ 9

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II. B. Major Laboratory and Facility Funding

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Continuous Electron Beam Accelerator Facility ...	$ 10,350	$ 17,255	$ 23,765	+ 38
Los Alamos National Scientific Laboratory	$ 48,180	$ 47,131	$ 47,700	+ 1
Massachusetts Institute of Technology	$ 9,900	$ 10,155	$ 10,705	+ 5

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Medium Energy Nuclear Physics			
Research			
LAMPF-Based Research	Continue use of Clamshell Spectrometer on the Low Energy Pion (LEP) channel and expand use of neutron time-of-flight facility. Initiate research program using medium resolution spectrometer (MRS).	Conduct full experimental program using MRS with beam from new high intensity polarized proton source. Complete preparations on LEP channel for installation of energy spread compressor.	Continue use of MRS with polarized beams. Complete installation of energy spread compressor on LEP channel and begin experiments.
	Analyze data from neutrino oscillation experiment and move detector further from beam stop.	Begin taking longer flight path data for neutrino oscillation experiment, and begin R&D activies for next-generation neutrino experiment.	Complete data taking for neutrino oscillation experiment, and continue R&D activities for new neutrino experiment.
	Continue use of time-of-flight isochronous (TOFI) facility for nuclear mass measurements and develop new detector to resolve heavier isotopes.	Use new detector on TOFI to extend studies to higher masses.	Do selected high mass studies on TOFI.
	Complete preparations for rare muon decay (MEGA) experiment involving 32 scientists from 13 institutions and requiring $3.5M detector.	Start data taking phase of MEGA experiment with intermediate-sensitivity form of detector.	Complete full sensitivity detector for MEGA and continue data taking.

III. Medium Energy Nuclear Physics (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
LAMPF-Based Research (Cont'd)	Continue research programs in nuclear structure and nuclear reactions with incident pions and protons. Continue research on nuclear structure with a polarized nuclear target. Continue measurements of the nucleon-nucleon interaction and tests of charge symmetry breaking.	Continue research programs in nuclear structure and nuclear reactions with incident pions and protons. Continue research using the polarized nuclear target. Expand measurement of the nucleon-nucleon interaction and tests of charge symmetry breaking.	Continue nuclear structure and reaction mechanism studies. Postpone experimental program using both polarized beams and polarized targets.
	The total for LAMPF-Based Research is derived as follows. Of the $6,600 medium energy research budget at LANL, $647 is for research carried out by LANL scientists at locations other than LAMPF, leaving $5,953 for in-house use of LAMPF. To this is added $4,503 of direct medium energy research funds to outside users for their LAMPF research programs.	The total for LAMPF-Based Research is derived as follows. Of the $7,000 medium energy research budget at LANL, $680 is for research carried out by LANL scientists at locations other than LAMPF, leaving $6,320 for in-house use of LAMPF. To this is added $4,591 of direct medium energy research funds to outside users for their LAMPF research programs.	The total for LAMPF-Based Research is derived as follows. Of the $6,700 medium energy research budget at LANL, $780 is for research carried out by LANL scientists at locations other than LAMPF, leaving $5,920 for in-house use of LAMPF. To this is added $5,001 of direct medium energy research funds to outside users for their LAMPF research programs.
	$ 10,456	$ 10,911	$ 10,921
Bates Based Research	Complete parity experiment and begin multi-arm coincidence measurements utilizing the improved polarized electron beam.	Continue coincidence measurements with higher intensity polarized electron beams.	Expand coincidence measurements with polarized electron beams. Emphasize form factor experiments using spin observables.
	Prepare for out-of-plane spectrometer measurements (delta experiment). Continue class IV computer upgrade at the Laboratory for Nuclear Science (LNS).	Carry out delta experiment and continue computer upgrade at LNS.	Carry out experiment on the electromagnetic response of the deuteron and continue computer upgrade at LNS.
	Continue high precision measurements utilizing the energy loss spectrometer system (ELSSY) and coincidence measurements utilizing South Hall spectrometers.	Continue high precision measurements with ELSSY and reduce level of research utilizing South Hall spectrometers during installation of South Hall Ring Experiment.	Expand high precision measurements with ELSSY and continue low level of research in South Hall as South Hall Ring Experiment installation continues.
	Design internal gas-jet target system for use in the South Hall Ring Experiment and continue R&D on pulse stretcher rings with emphasis on maintenance of beam polarization.	Continue R&D on behavior of polarized beams in stretcher rings and design of detector components for use in the South Hall.	Continue R&D on behavior of polarized beams in stretcher rings and detector design.

III. Medium Energy Nuclear Physics (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Bates Based Research (Cont'd)	The total for Bates-Based Research is derived as follows. Of the $3,050 medium energy research budget at MIT, $1,000 is for research carried out by MIT scientists at locations other than Bates, leaving $2,050 for in-house use of Bates. To this is added $1,057 of direct medium energy research funds to outside users for their Bates research programs.	The total for Bates-Based Research is derived as follows. Of the $3,155 medium energy research budget at MIT, $1,040 is for research carried out by MIT scientists at locations other than Bates, leaving $2,115 for in-house use of Bates. To this is added $1,167 of direct medium energy research funds to outside users for their Bates research programs.	The total for Bates-Based Research is derived as follows. Of the $3,305 medium energy research budget at MIT, $1,105 is for research carried out by MIT scientists at locations other than Bates, leaving $2,200 for in-house use of Bates. To this is added $1,091 of direct medium energy research funds to outside users for their Bates research programs.
	$ 3,107	$ 3,282	$ 3,291
CEBAF-Based Research	Complete a cryomodule, the basic unit of accelerator structure that can be cooled to superconducting temperature.	Complete installation of equipment for front-end testing of the accelerator utilizing 1 1/4 cryomodules, to 25 MeV energy. Perform pre-operational testing of beam diagnostic hardware and software. Prepare for operation of the Central Helium Liquefier.	Continue work on cryomodule diagnostics. Carry out 25 MeV front-end test and extend test to 45 MeV. Operate Central Helium Liquefier. Staff Machine Control Center around the clock.
	Develop the thermionic injector for the accelerator. Implement a magnetic measurement capability for the components of the beam transport system.	Establish a data acquisition system for use in testing and calibrations of components. Provide related systems needed for experimental halls. Expand microVAX cluster.	Expand data acquisition system CPU with additional workstations.
	Carry out detailed development for spectrometer and detector systems.	Prototype and test components for the experimental areas including setting up a magnet test facility, prototyping of quadrupole magnets, and prototyping various detector and counting electronic components.	Complete testing and prototyping of experimental area components.
	Continue activities in superconducting research area at CEBAF.	Continue superconducting research activities and strengthen theoretical efforts.	Continue superconducting research activities and strengthen theoretical efforts.

III. Medium Energy Nuclear Physics (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
CEBAF-Based Research (Cont'd)	The total for CEBAF-Based Research is derived as follows. Of the $9,350 medium energy research budget at CEBAF, $500 is for research carried out by CEBAF scientists at locations other than CEBAF, leaving $8,850 for in-house use of CEBAF. To this is added $72 of direct medium energy research funds to outside users for their CEBAF research programs.	The total for CEBAF-Based Research is derived as follows. Of the $11,240 medium energy research budget at CEBAF, $800 is for research carried out by CEBAF scientists at locations other than CEBAF, leaving $10,440 for in-house use of CEBAF. To this is added $844 of direct medium energy research funds to outside users for their CEBAF research programs.	The total for CEBAF-Based Research is derived as follows. Of the $11,365 medium energy research budget at CEBAF, $800 is for research carried out by CEBAF scientists at locations other than CEBAF, leaving $10,565 for in-house use of CEBAF. To this is added $1,644 of direct medium energy research funds to outside users for their CEBAF research programs.
	$ 8,922	$ 11,284	$ 12,209
Research at Other Sites	Continue data taking phase of rare kaon decay experiments and continue preparations for experiments using new kaon beam line in search for rare two-nucleon structures (H particles).	Begin second phase of rare kaon decay experiments and start taking data for H-particle search.	Complete first phase of H-particle search and begin second experimental approach.
	Continue electron scattering experiments using NPAS and start evaluation of proposed experiments using gas jet target in PEP ring at SLAC.	Suspend NPAS End Station A program and continue evaluation of use of PEP ring at SLAC.	Retain possibility of doing experiments using PEP ring at SLAC.
	Utilize upgraded Low Energy Antiproton Ring (LEAR) facility at CERN for high intensity antiproton experiments.	Complete data taking for crystal barrel experiment LEAR facility. Use CERN 100 GeV muon beam for measurement of spin-dependent structure functions of the neutron and proton.	Continue spin structure function experiment at CERN.
	Initiate data taking phase of the St. Gotthard xenon double beta decay experiment.	Continue xenon phase of St. Gotthard double beta decay experiment.	Conclude xenon phase of St. Gotthard double beta decay experiment.
	Start first round of experiments on the Laser Electron Gamma Source (LEGS) facility at the National Synchrotron Light Source at BNL.	Expand experimental program to full planned operating level of BNL group using the LEGS facility and broaden LEGS experimental program to include users from universities and other laboratories.	Continue full use of LEGS facility.

III. Medium Energy Nuclear Physics (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Research at Other Sites (Cont'd)	Conduct program of selected nuclear physics experiments at other facilities including Fermilab, TRIUMF (Canada), Saclay (France), PSI (Switzerland), and NIKHEF (Netherlands).	Conduct program of selected nuclear physics experiments at other facilities including Fermilab, TRIUMF (Canada), Saclay (France), PSI (Switzerland), and NIKHEF (Netherlands).	Conduct program of selected nuclear physics experiments at other facilities including Fermilab, TRIUMF (Canada), PSI (Switzerland), and NIKHEF (Netherlands).
	$ 11,041	$ 12,180	$ 12,379
Subtotal, Research	$ 33,526	$ 37,665	$ 38,800
Operations			
LAMPF Operations	Operate accelerator and facilities with decreased experimental support; about 2700 hours for nuclear physics research with about seven secondary beams operating simultaneously.	Operate accelerator and facilities about 2400 hours for nuclear physics research with about seven secondary beams operating simultaneously.	Operate accelerator and facilities about 2400 hours for nuclear physics research with a reduced number of secondary beams operating simultaneously.
	Provide beam for approximately 56 nuclear physics experiments involving about 320 scientists.	Provide beam for approximately 52 nuclear physics experiments involving about 300 scientists.	Provide beam for approximately 45 nuclear physics experiments involving about 280 scientists.
	Commission medium resolution spectrometer and continue support for installation of high intensity polarized ion source. Begin construction of energy spread compressor for low energy pion (LEP) channel.	Start operation of high intensity polarized ion source. Begin operation of LEP channel with energy spread compressor.	Utilize newly installed computers for remote analysis capability. Expand operation with high intensity polarized ion source and polarized targets.
	$ 41,580	$ 40,426	$ 41,000
Bates Operations	Operate accelerator and facilities about 2350 hours for nuclear physics research.	Operate accelerator and facilities about 1800 hours for nuclear physics research.	Operate accelerator and facilities about 2000 hours for nuclear physics research.
	Provide beam for approximately 30 experiments involving about 125 scientists.	Provide beam for approximately 30 experiments involving about 125 scientists.	Provide beam for approximately 30 experiments involving about 125 scientists.
	Operate accelerator at 1 GeV for required experiments during selected operating cycles during the year.	Operate accelerator at 1 GeV for required experiments during selected operating cycles during the year.	Operate accelerator at 1 GeV for required experiments during selected operating cycles during the year.

III. Medium Energy Nuclear Physics (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Bates Operations (Cont'd)	Begin installation and testing of components for South Hall Ring Experiment.	Continue installation and testing of components for South Hall Ring Experiment.	Continue installation and testing of components for South Hall Ring Experiment.
	$ 6,850	$ 7,000	$ 7,400
CEBAF Operations	Provides for startup of laboratory operations and accelerator commissioning.	Provides for startup of laboratory operations and accelerator commissioning.	Provides for startup of laboratory operations and accelerator commissioning.
	$ 1,000	$ 6,015	$ 12,400
Other Operations	Operate Nuclear Physics Injector and facilities at SLAC for 1000 hours. Provide beams of six GeV electrons for experiments involving about 50 scientists.	Suspend operation of NPI at SLAC.	Suspend operation of NPI at SLAC.
	Continue operations support for the Bevalac medium energy research activities (300 hours).	Continue operations support for the Bevalac medium energy research activities (300 hours).	Continue operations support for the Bevalac medium energy research activities (350 hours).
	$ 2,235	$ 1,282	$ 1,400
Subtotal, Operations	$ 51,665	$ 54,723	$ 62,200
Medium Energy Nuclear Physics	$ 85,191	$ 92,388	$ 101,000

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR PHYSICS

I. Preface: Heavy Ion Nuclear Physics

The Heavy Ion Research subprogram is aimed at understanding the behavior of nuclear matter over an ever increasing range of excitation energy, nuclear density, angular momentum, and deformation. These conditions are created in collisions between nuclear beams and nuclear targets. The heavy ion beams are produced by highly sophisticated accelerators located at three large universities (Texas A&M, Yale, University of Washington) and four National laboratories (Argonne, Brookhaven, Lawrence Berkeley, Oak Ridge). At low bombarding energies, studies include the high spin behavior of cold nuclear matter causing severe deformation and eventually fission. Also nuclear orbiting phenomena are studied. Especially intriguing are close encounters of the heaviest nuclei which lead to unexplained spontaneous electron and positron production. The nuclear dynamics of complex phenomena including the evolution of the compound nucleus, deep-inelastic scattering and projectile multifragmentation are studied at intermediate bombarding energies. Radioactive beams are produced to study ground state properties of exotic nuclei out to the very limits of stability. At higher energies, exploration is made of the nuclear matter equation of state for hot dense nuclear matter and the deconfinement of hadronic matter into the quark-gluon plasma. Some consolidation of low energy activities at national laboratories is planned.

II. A. Summary Table: Heavy Ion Nuclear Physics

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Research				
LBL Bevalac Research	$ 5,679	$ 6,000	$ 6,154	+ 3
BNL Tandem/AGS Research	8,509	8,628	9,500	+ 10
National Laboratory Research	8,873	9,671	10,056	+ 4
University Research	8,130	8,604	11,019	+ 28
Subtotal, Research	$ 31,391	$ 32,903	$ 36,729	+ 12
Operations				
LBL Bevalac Operations	$ 10,680	$ 10,085	$ 17,685	+ 10
BNL/Tandem/AGS Operations	7,350	7,691	9,000	+ 17
ANL, LBL 88", ORNL Operations	9,205	8,885	7,315	- 18
University Accelerator Operations	1,840	1,952	2,200	+ 13
Subtotal, Operations	$ 35,085	$ 34,613	$ 36,200	+ 5
Total, Heavy Ion Nuclear Physics	$ 66,476	$ 67,516	$ 72,929	+ 8

II. B. Major Laboratory and Facility Funding

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Argonne National Laboratory	$ 5,433	$ 6,142	$ 6,920	+ 13
Brookhaven National Laboratory	$ 15,859	$ 16,319	$ 18,500	+ 13
Lawrence Berkeley National Laboratory	$ 26,159	$ 25,123	$ 27,620	+ 10
Los Alamos National Scientific Laboratory	$ 890	$ 907	$ 950	+ 5
Oak Ridge National Laboratory	$ 8,070	$ 7,853	$ 8,170	+ 4
Lawrence Livermore National Laboratory	$ 95	$ 123	$ 150	+ 22

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Heavy Ion Nuclear Physics			
Research			
LBL Bevalac Research	Continue experiments at Heavy Ion Superconducting Spectrometer (HISS) and Low Energy beam lines to study fragmentation of very heavy beams. Begin using a reverse kinematics detector for intermediate energy studies. Continue fabrication of time projection chamber (TPC) detector. Continue experiments with the Dilepton Spectrometer (DLS) to explore high energy nuclear dynamics at the earliest stages of the collision process. Continue the analyses of the initial CERN oxygen and sulfur experiments and prepare for next generation experiments with sulfur and future program with lead beams.	Continue experiments at HISS to study multipion production with heaviest beams, exclusive fragmentation of light systems and studies with radioactive beams. Complete fabrication, test components, and start to assemble the HISS TPC. Use pion observables obtained from streamer chamber to extract information on equation of state for Au+Au collisions. Continue to operate and upgrade the DLS to probe the hot high density phase of the collision process. Use heaviest beams available to continue to study multifragmentation processes at the Low Energy Beam line. Start prototyping for next generation intermediate energy detector (IMED) to obtain more complete information on collisions at intermediate energy to study the predicted liquid-gas phase transition. Continue analyses of initial data from CERN and conduct new experiments to learn about strangeness production and energy densities achieved in these collisions. Explore physics potential of lead beam experiments. Continue	Continue testing HISS TPC and begin study of equation of state of nuclear matter at high density and temperature. Finish analysis of pion production from collisions of gold nuclei on gold targets using the streamer chamber and phase out further streamer chamber operation. Continue use of HISS for: radio-active beams, high energy multifragmentation of heavy beams with MUSIC II, neutron production in central collisions, etc. Upgrade DLS with Ring Imaging Cerenkov (RICH) detectors and continue to use this unique probe of the hot, dense phase of collision process. Continue studies of multifragmentation at intermediate energies at Low Energy Beam Line. Continue R&D on new IMEX detector. Analyze new data from latest CERN experiments using sulfur beams and continue discussion and preparation for possible lead beam experiments in 1990's. Continue involvement in R&D for RHIC detectors, and participate in discussions leading toward a proposal for a detector at RHIC.

III. Heavy Ion Nuclear Physics (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
LBL Bevalac Research (Cont'd)		study of possible AGS experiment (e.g., dileptons).	
	$ 5,879	$ 6,000	$ 6,154
BNL Tandem/AGS Research	Continue data taking on experiment E802, complete analysis of initial data, and start upgrade of E802 for future gold beams. Finish testing time projection chamber for E810 and begin experimental program. Complete assembly and testing of E814 and begin experimental program with full complement of detectors. Continue discussion of possible new experimental probes (e.g., dileptons) to study central collisions at AGS energies. Continue R&D towards a RHIC at about $6.2 million.	Continue experimental program at AGS with heavy ions and prepare for gold beams. Use enhanced multiplicity and particle identification capabilities of experiment E802 to look for possible precursors of a baryon-rich quark-gluon plasma. Support upgrade of E802 detectors for gold beams. Concentrate on the physics analysis of E810 time projection chamber for strangeness production. Continue active research program at E814 measuring energy flow and searching for exotic nuclear structures produced in heavy ion collisions. Begin AGS experiment for detection of anti-protons from heavy ion collisions, E858. Continue R&D towards a RHIC at about $8.5 million, and begin active consideration of first-round RHIC detectors.	Continue program at AGS with upgraded tracking system for E802, (E859), to study two-particle interferometry (pion-pion and kaon-kaon) to learn about space-time development of collision. Continue analysis of existing data and continue upgrading detector for Au beams expected in FY 1992. Continue analysis of proton and silicon beam data on energy flow and nuclear stopping from E814 and start upgrading detector for Au beams. Analyze multiparticle data from TPC experiment E810 and study possible upgrade of system for heavy beams. Continue new experiment to measure anti-particle production in nuclear matter. Evaluate installation of new experiment at AGS measuring productions of dileptons providing new probe of high density and temperature phase at AGS energies. Continue R&D towards RHIC at about $8.8 million, and participate in discussions leading toward proposals for detectors at RHIC.
	$ 8,509	$ 8,628	$ 9,500

III. Heavy Ion Nuclear Physics (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
National Laboratory Research	Continue the experimental program at ATLAS with emphasis on reactions near the Coulomb barrier using the heavier mass projectiles available from the improved injector. Begin design and testing of detector systems for the Fragment Mass Analyzer (FMA) for an experimental program on nuclei far from stability. Begin studies of apparatus to measure electron-positron production with future uranium beams.	Continue active experimental research program to take advantage of enhanced capabilities of ATLAS with emphasis on reaction mechanism studies, studies of highly deformed nuclei and production of nuclei far from stability. Begin experimental program with the FMA and support initial activities for large acceptance detector system to measure electron-positron correlations in uranium-uranium collisions.	Continue active experimental program at ATLAS with emphasis on the new opportunities for physics research possible with beams up to uranium. Operate the FMA to make possible new classes of experiments, particularly when coupled with the ANL/Notre Dame Gamma Ray detector. Begin tests and measurements with the ATLAS Positron-Electron Experiment (APEX). Continue activities related to fabrication of Gammasphere.
	Continue the experimental program at the 88" Cyclotron and study super-deformed bands at very high spin with HERA. Continue technological research on Electron Cyclotron Resonance (ECR) ion sources using strong fields and high frequencies.	Continue the experimental program at the 88" Cyclotron using the HERA gamma-ray detector. Continue the studies of reaction mechanisms induced by heavy ions provided by the ECR ion source. Continue to develop the technology necessary for new ECR-type ion sources at strong fields and high frequencies.	Continue the experimental program at the 88" Cyclotron for high spin studies utilizing the HERA gamma-ray detector, and newly installed ultra-fast data acquisition and analysis system. Continue studies of reaction mechanisms with emphasis on the new classes of studies possible with the heavier mass and higher intensity beams available from the Advanced ECR. Continue activities related to fabrication of Gammasphere.
	Continue the experimental program at HHIRF with emphasis on improved capabilities with gamma-ray detection and a more fully implemented heavy-ion, light-ion detector system. Continue data analysis of CERN WA80 experiment. Begin studying physics potential of lead beam experiments at CERN.	At HHIRF continue the experimental program to measure the properties of superdeformed nuclei. Utilize the enhanced capabilities of the completed heavy-ion, light-ion (HILI) detector to study nuclear reaction mechanisms. Continue the analysis of the CERN WA80 experiment with particular emphasis on measurements from the photon detectors. Continue to explore the physics potential of lead beams at CERN for studying high energy density nuclear matter.	Continue research program at HHIRF studying high spin collective properties of nuclei, and residual nucleon-nucleon interactions using the Compton Suppression Spectrometer System. Study reaction mechanisms using available detector systems, including upgraded HILI detector system. Continue activities related to fabrication of Gammasphere. Continue study of high energy photons using the barium fluoride array to investigate giant dipole resonances and bremsstrahlung-like photon production at HHIRF and other accelerator facilities. Participate in next heavy-ion run at CERN and analysis of data. Continue activities for lead beam experiments. Continue studying

III. Heavy Ion Nuclear Physics (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
National Laboratory Research (Cont'd)			detector R&D problems for RHIC, and participate in discussions leading toward a proposal for a detector at RHIC.
	At LANL, continue analysis of CERN data, and complete assembly and begin installation of participant calorimeter at BNL for experiment E814.	At LANL, complete the analysis of the data on charged particle production from the HELIOS experiment at CERN. Participate in the operation of the participant calorimeters for E814 at the AGS and begin analysis of initial data. Participate in initial program using new focussing spectrometer at CERN.	At LANL, continue to participate in experiment E814 at BNL and analysis of spectrometer experiment at CERN, and participate in discussions leading toward a proposal for a detector at RHIC.
	At LLNL, continue Bevalac program and develop new counters for future experiment at AGS with heavy ions.	At LLNL, finalize analyses of Bevalac data and develop detector technology in preparation for heavy ion experiment at the Tandem/AGS.	At LLNL, finish up analysis of Bevalac experiments. Participate in the second generation E802 Experiment at AGS. Continue studying detector R&D problems for RHIC, and participate in discussions leading toward a proposal for a detector at RHIC.
	$ 8,873	$ 9,671	$ 10,056
University Research	Continue university user-group research programs and enhance detector R&D efforts. Continue nuclear physics research programs at the Yale Tandem on investigating nuclei far from stability. Use the higher energies of the University of Washington superconducting linac booster to study charged particle emission. Exploit the new capabilities of the Texas A&M superconducting cyclotron to study subthreshold pion production.	Continue and strengthen university user-group research programs at national laboratory accelerators. Continue the nuclear physics program at the upgraded Yale Tandem with emphasis on low-energy heavy ion interactions. At the University of Washington superconducting linac use the higher energy lighter projectiles and upgraded detector systems to continue the study of phenomena of hot nuclear systems. Use the higher energies of the Texas A&M superconducting cyclotron to study the production of subthreshold neutral pions and very energetic photons to probe collective behavior in nuclei. Increase detector studies for a wide range of nuclear problems. $493,000 will be provided for implementation of	Continue strengthening university user research activities at national laboratory accelerators where unique opportunities are available. At the upgraded Yale Tandem continue nuclear physics studies with emphasis on using new detector systems to study nuclear spectroscopy of highly deformed systems, nuclear molecular phenomena, parity nonconservation studies in light systems and nuclear astrophysics. With the University of Washington superconducting linac use improved detectors to probe limits of nuclear deformation and study of hot nuclear systems. Using the higher energies available at the superconducting Texas A&M cyclotron to continue study of subthreshold pions to isolate

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III. Heavy Ion Nuclear Physics (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
University Research (Cont'd)		the Energy Sciences Network (ESNET) project, which is identified in the Applied Mathematical Sciences subprogram of the Basic Energy Sciences program.	collective phenomena and study how highly excited systems evolve with energy. Continue emphasis on improving detector systems at all accelerators. Provision of funds to upgrade ESNET to conform to National Research and Education Network standards will continue at an approximately constant or slightly reduced level from FY'1990.
	$ 8,130	$ 8,604	$ 11,019
Subtotal, Research	$ 31,391	$ 32,903	$ 38,729
Operations			
LBL Bevalac Operations	Continue to provide up to 3500 hours of heavy ion beam time for the research program including one-third time for biomedical research. Make full utilization of the specialized low energy, kaon, and secondary radioactive beam lines. Begin to phase out the independent research program at the SuperHILAC.	Continue heavy ion operating time at about 3200 hours for the research program utilizing the full-range of ions and energies available from the Bevalac, including one third time for biomedical research. Make use of the complete complement of beam lines for carrying out experiments at HISS, DLS, streamer chamber, Low Energy beam lines and the Beam 40 area. Start implementing changes to experimental areas and beam delivery to enhance research program. Complete phase-out of SuperHILAC operations for independent research.	Continue facility operation for nuclear physics and biomedical (one third time) research at about 3200 hours. Use full complement of beamlines for program at HISS, dilepton spectrometer, radioactive beams, and Low Energy work. Begin initial experiments with HISS TPC. Phase-out of streamer chamber facility. Continue to upgrade experimental areas and improve the quality (e.g., duty factor, spot size) and quantity of beam delivered for experimental program. SuperHILAC to continue to serve as dedicated injector for Bevalac.
	$ 16,890	$ 18,085	$ 17,685
BNL/Tandem/AGS Operations	Operate Tandem/AGS accelerator system to produce up to 7 weeks of light ions (including protons) for the approved relativistic heavy ion experiments. Complete installation of beamline for E814.	Operate Tandem/AGS system to provide up to 7 weeks of heavy ion operation with ions up to silicon for the approved relativistic heavy ion program. Provide appropriate additions to the beam lines for the future gold beams program and start new beam line for next generation AGS experiment.	Continue to operate Tandem/AGS system for heavy ion research, providing up to 10 weeks for experimental program with beams up to silicon. Continue to provide additions to beam lines for future operation with gold beams. Begin commissioning phase of operation of AGS Booster for heavy ion beams.

III. Heavy Ion Nuclear Physics (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
BNL/Tandem/AGS Operations (Cont'd)	$ 7,350	$ 7,891	$ 9,000
ANL, LBL 88", ORNL Operations	Provide 3500 hours of ATLAS operation for nuclear physics experiments. Support installation of new beam line for the FMA. Provide 4000 hours of operation of the 88" Cyclotron and continue development of the ECR ion source. Provide 3800 hours of HHIRF operation for nuclear physics program and atomic physics research programs. Operate upgraded accelerator tubes with greater reliability and increasing voltage. Reduce coupled Tandem/Cyclotron operation as Tandem performance improves.	Provide for operation of the ANL ATLAS facility for research programs to utilize the new uranium heavy ion beam capabilities. Provide beams for the complete set of detectors at ATLAS, including the newly developed Fragment Mass Analyses (FMA). Provide operation of the 88" Cyclotron for nuclear physics research and continue with development of ECR ion source. At HHIRF, terminate all but essential operations in the coupled Tandem/Cyclotron mode and continue to improve Tandem operation for nuclear and atomic physics research at HHIRF. Continue to provide beams to all caves and to the upgraded detectors such as HILI and the Spin Spectrometer. Start activities leading to phase out of operations at one of these low energy heavy ion facilities.	Complete upgrade of the ANL ATLAS facility for uranium beam capability. Provide heavy-ion beams for research utilizing all ATLAS detector systems, including newly installed FMA operating with Compton-suppressed Germanium detectors around the target. Provide support for the installation and operation of the APEX detector for positron-electron coincidence measurements. Provide beams for heavy-ion research at the LBL 88" Cyclotron, utilizing newly developed 14.5 GHz Advanced ECR source for production of high intensity beams of masses up to A=200. Provide heavy-ion beams for nuclear physics research at HHIRF utilizing all detector systems, including the barium fluoride array and an expanded capability HILI detector. Support installation of the Recoil Mass Spectrometer (RMS). Continue phase out activities at one of these three facilities.
	$ 9,705	$ 8,885	$ 7,315
University Accelerator Operations	Provide light heavy ion beams for experiments using the upgraded facilities at Yale University. Provide light heavy ion beams for in-house experiments at the University of Washington using the superconducting linac booster. Provide light and medium mass heavy ion beams for experimental programs at Texas A&M University.	Continue to provide light heavy ions at increased energies for the upgraded facilities and detectors at the Yale Tandem for a full research program. Provide light ions from the superconducting linac booster at the University of Washington for its in-house Nuclear Physics program. Continue to provide energetic light to medium mass projectiles for the Nuclear Physics program at the upgraded Texas A&M superconducting cyclotron.	Provide for continuing operation of heavy ion research programs at the three major university accelerator facilities using large range of ions and energies. At Yale Tandem provide light heavy ions with upgraded detectors to carry out a broad program of nuclear physics research. At the University of Washington superconducting linac booster provide light ions for in-house programs including new detector systems. Provide light to medium mass ions at low to intermediate energies for the

III. Heavy Ion Nuclear Physics (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
			nuclear physics program at the Texas A&M superconducting cyclotron.
University Accelerator Operations (Cont'd)			
	$ 1,840	$ 1,952	$ 2,200
Subtotal, Operations	$ 35,085	$ 34,613	$ 36,200
Heavy Ion Nuclear Physics	$ 66,476	$ 67,516	$ 72,929

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR PHYSICS

I. Preface: Low Energy Nuclear Physics

The basic research part of this subprogram emphasizes experimental investigations of nuclear structure, nuclear decay parameters, and low energy nuclear reaction mechanisms, as well as experimental tests of fundamental theories and symmetries, which often can be accomplished with low energy accelerators, or without the use of accelerators: for example, the study of neutrinos from the sun. University-based research is an important feature of the Low Energy program. Since most of the facilities are relatively small, they are appropriate for siting on university campuses, where they provide excellent opportunities for hands-on training of nuclear experimentalists, many of whom contribute after obtaining Ph.D.s to nuclear technology development of interest to the DOE. The nuclear data part of this subprogram has as its goal the establishment and maintenance of an accurate, complete, and accessible nuclear data base to meet the needs of the DOE nuclear technologies, which include: fission and fusion energy, biomedical and environmental applications of radioactive materials, nuclear waste management, and nuclear weapon development.

II. A. Summary Table: Low Energy Nuclear Physics

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Research				
Research at University Facilities	$ 2,710	$ 2,776	$ 3,070	+ 11
Research at National Laboratory Accelerators	3,515	3,554	3,265	- 8
Research at Reactors	1,036	1,071	1,110	+ 4
Other Research	3,177	4,609	5,640	+ 22
Subtotal, Research	$ 10,438	$ 12,010	$ 13,085	+ 9
Operations				
Accelerator Operations	$ 3,100	$ 3,194	$ 3,315	+ 4
Subtotal, Operations	$ 3,100	$ 3,194	$ 3,315	+ 4
Nuclear Data				
Nuclear Data Measurements	$ 6,315	$ 6,499	$ 6,748	+ 4
Nuclear Data Compilation and Evaluation	4,608	4,623	4,952	+ 7
Subtotal, Nuclear Data	$ 10,923	$ 11,122	$ 11,700	+ 5
Total, Low Energy Nuclear Physics	$ 24,461	$ 26,326	$ 28,100	+ 7

II. B. Major Laboratory and Facility Funding

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Ames Laboratory	$ 205	$ 202	$ 210	+ 4
Argonne National Laboratory	$ 2,960	$ 2,962	$ 3,100	+ 5
Brookhaven National Laboratory	$ 3,805	$ 3,708	$ 3,930	+ 6
Idaho National Engineering Laboratory - EG&G	$ 335	$ 330	$ 350	+ 6
Lawrence Berkeley National Laboratory	$ 2,130	$ 2,184	$ 2,360	+ 8
Lawrence Livermore National Laboratory	$ 230	$ 227	$ 240	+ 6
Los Alamos National Scientific Laboratory	$ 1,440	$ 1,498	$ 1,415	- 6
Oak Ridge National Laboratory	$ 4,720	$ 4,605	$ 4,995	+ 8

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Low Energy Nuclear Physics			
Research			
Research at University Facilities	Continue utilization of upgraded facilities. At the University of Washington, develop a broader range of polarized and unpolarized beams with improved quality and new instrumentation for light and heavy-ion reaction studies. Continue development of a proton spectrometer at Texas A&M for studies of spin- flip, charge-exchange reactions. Use the new polarized ion source at Duke, with the cryogenic polarized target, to perform much improved measurements of spin-spin effects in neutron- nucleus reactions and to begin time-reversal invariance tests.	At Texas A&M, the proton spectrometer will be commissioned, and experiments using the (d, He-2) reaction will begin; at Duke, begin spin-spin cross-section measurements using a cryogenic polarized target of solid He-3; at Washington, exploit the higher energy lighter heavy-ion beams available from the superconducting Linac booster to study reaction mechanisms at the Coulomb barrier.	At Texas A&M, begin the development of a high-resolution 180 MeV neutron beam to be used with the proton spectrometer for (n,p) studies of the weak interaction; at Duke, continue the spin-spin cross-section measurements and time-reversal invariance tests; at Washington, use the new polarized ion source and the higher energy beams provided by the booster to study the scattering of polarized protons with emphasis on backward angle spin structure measurements.
	$ 2,710	$ 2,776	$ 3,070

III. Low Energy Nuclear Physics (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Research at National Laboratory Accelerators	Continue low energy research at ANL, LBL, and ORNL. At LBL, high intensity He-3 beams will be used with the RAMA on-line separator to attempt to observe the decay of nuclides which are adjacent to, or are defining of, the proton drip-line in the sd-shell. At ORNL, nuclear structure studies at the UNISOR will be greatly enhanced when a nuclear orientation facility can be brought into operation which will permit more complete determination of the electromagnetic properties of gamma-ray transitions.	Continue low energy research at ANL, LGL, and ORNL. At LBL, continue to search for nuclei near the proton and neutron drip-lines that may decay by new and exotic radioactivities, and make use of the excellent polarized proton and deuteron beams from the 88-Inch Cyclotron to study spin-polarization effects. At ORNL, the cryogenic nuclear orientation facility will be returned from the manufacturer and experiments on-line at UNISOR should begin.	Continue low energy research at the three laboratories. At LBL, the 88-Inch Cyclotron is used extensively to produce light ions for the nuclear astrophysics group, but some effort will be shifted to the Sudbury Neutrino Observatory project; at ORNL, the nuclear orientation facility should finally come into full operation, initially to determine complete level schemes for odd-mass nuclei in the A=190 region to explore manifestations of boson-fermion symmetries.
	$ 3,515	$ 3,554	$ 3,285
Research at Reactors	Continue support of the BNL-led effort to obtain a systematic understanding of nuclear structure in heavy nuclei, and its evolution with N, Z, A, and the number of valence protons and neutrons. Continue ion source development, particularly for studies of astrophysical interest. The neutron lifetime measurement at the ILL reactor in France should be completed.	Continue to support the BNL-led Participating Research Team at the TRISTAN facility in a unified program of forefront nuclear structure studies, emphasizing the neutron-rich nuclides produced in fission. Measurements of fundamental properties of the neutron are expected to continue at the new cold neutron beam line at the NIST (formerly NBS).	Continue to support the nuclear structure studies at the TRISTAN isotope separator, in particular, the exploitation of a breakthrough in picosecond timing that permits measurement of the life times of nuclear levels for nuclides far from stability, as well as the studies of fundamental properties of the neutron at the NIST (formerly the National Bureau of Standards).
	$ 1,036	$ 1,071	$ 1,110
Other Research	Continue solar neutrino research at an increased level. Strengthen the US effort in support of the Soviet-American Gallium Experiment (SAGE) and continue participation in GALLEX experiment. Transfer support for BNL nuclear group from low energy Tandem based research to relativistic heavy ion reactions at the Tandem/AGS facility in Heavy Ion subprogram.	Provide R&D support for proposed U.S. participation in the Canadian Sudbury Neutrino Observatory (SNO) project, involving a large, deeply buried, heavy-water Cerenkov detector to measure solar neutrino fluxes and higher energy spectra for neutrinos of all types. Preliminary results are expected from the SAGE metallic gallium experiment. Continue support of the joint US/European 35-ton gallium chloride GALLEX experiment.	Based on very favorable reviews, and the anticipated initiation of the SNO project by Canada, provide increased funding for SNO detector R&D at LANL, LBL, and University of Pennsylvania. Conclude effort devoted to Mo/Tc solar neutrino detection at LLNL. Continue support of the GALLEX experiment with first data expected this year.

III. Low Energy Nuclear Physics (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Other Research (Cont'd)	$ 3,177	$ 4,609	$ 5,640
Subtotal, Research	$ 10,438	$ 12,010	$ 13,085
Operations			
Accelerator Operations	Provide support (together with Heavy Ion Physics) for three university and three national laboratory accelerator facilities at ANL, LBL, and ORNL. Complete construction of the polarized ion source at Duke University.	Continue support for the accelerator facilities at Duke University (Triangle Universities Nuclear Laboratory) and, together with the Heavy Ion program, at Texas A&M, the University of Washington, and three national laboratories. Complete the proton spectrometer at Texas A&M and enhance the cryogenic polarized target facility at Duke, by enabling the use of polarized solid He-3.	Continue support for the three university and three national laboratory accelerator facilities.
	$ 3,100	$ 3,194	$ 3,315
Subtotal, Operations	$ 3,100	$ 3,194	$ 3,315
Nuclear Data			
Nuclear Data Measurements	Continue nuclear data measurement program at about same level. Complete the construction of the large, segmented, full-solid-angle gamma-ray detector to be used at the ORELA as a photon-multiplicity detector. Neutron cross section measurements for structural materials continue at the Fast Neutron Generator (FNG). Operation of the electron linac at NIST terminated with the measurement program transferred to ORELA and WNR (at LANL).	Begin measurements at the ORELA using the new large detector to obtain unadjusted differential measurements of capture cross sections and capture-to-fission ratios for the first time, to meet accuracy requirements of reactor designers, use newly designed detector system to improve measurements of neutron capture cross sections for medium-weight structural materials. At the FNG, begin difficult measurements of cross sections for the production of long-lived activities of interest to the Office of Fusion Energy.	Continue nuclear data measurements at the ORNL/ORELA and the ANL/FNG. At the ORELA, begin an extensive measurement program, including determination of capture-to-fission ratios for all important fissile isotopes, using the photon multiplicity detector. At ANL, continue long-lived activity measurements for fusion, and continue measurements of total and scattering cross sections for fast neutrons on high-temperature materials. At the NIST, with the shut down of the electron linear accelerator, begin phase out of experimental program. At LANL, phase out the successfully completed fusion reaction measurement program.

III. Low Energy Nuclear Physics (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Nuclear Data Measurements (Cont'd)	$ 6,315	$ 6,499	$ 6,748
Nuclear Data Compilation and Evaluation	Continue nuclear data compilation and evaluation at about the same level. The latest version of the Evaluated Nuclear Data File (ENDF-6) is expected to be nearing completion; a significant advance over previous versions should result from the inclusion of recent data measured for the purpose, and from improvements in nuclear models and evaluation methods. The cycle time for the evaluation of the A-chains for the Evaluated Nuclear Structure Data File (ENSDF) is expected to be shortened as the evaluators take advantage of their experience with computerized methods and as the LBL group resumes its evaluation effort.	Continue nuclear data compilation and evaluation at a slightly reduced level. ENDF-6 should be released by the end of 1989. An effort will be made to improve on-line access to the data files. (Better cooperation with international neutron cross section evaluation efforts is expected following the release of ENDF-6.) Possible improvements will be made to minimize the volume of publications, e.g., Nuclear Data Sheets, and to emphasize on-line access to a more timely updated ENSDF data base.	Continue the Cross Section Evaluation Working Group (CSEWG) to remain responsive to data needs and to continue improvements in coverage and format for ENDF. Support activities for the IAEA project to develop a library (FENDL) for the international fusion reactor program. Continue National Academy of Sciences/National Research Council panel on basic nuclear data compilation to explore improvements to ENSDF and the Nuclear Data Sheets and to respond to new areas of need for nuclear data.
	$ 4,608	$ 4,623	$ 4,952
Subtotal, Nuclear Data	$ 10,923	$ 11,122	$ 11,700
Low Energy Nuclear Physics	$ 24,461	$ 26,326	$ 28,100

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR PHYSICS

I. Preface: Nuclear Theory

The purpose of research in theoretical nuclear physics is to obtain a unified description of atomic nuclei. The research ranges from relating the description of elementary constituent particles and the fundamental forces connecting them, to accounting for the collective interactions of the nucleus as a whole. The long-range objectives of the Nuclear Theory subprogram are to obtain a comprehensive understanding of the foundations of nuclear matter at the most fundamental level, in terms of the properties of the constituent quarks and gluons, as well as the relation between the nucleons in the environment of the nucleus as a whole. These objectives are approached by interpreting results from nuclear physics experiments, and by predicting phenomena and relationships to test this description. The understanding of nuclear phenomena is prerequisite for a description of the material foundations of the universe, including astrophysics phenomena such as formation of the elements in stars and supernovae. Much of nuclear theory requires extensive use of supercomputer capabilities.

II. A. Summary Table: Nuclear Theory

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Nuclear Theory	$ 10,818	$ 12,226	$ 13,500	+ 10
Total, Nuclear Theory	$ 10,818	$ 12,226	$ 13,500	+ 10

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory	$ 930	$ 940	$ 985	+ 5
Brookhaven National Laboratory	$ 1,075	$ 1,040	$ 1,240	+ 19
Lawrence Berkeley National Laboratory	$ 950	$ 960	$ 1,005	+ 5
Los Alamos National Scientific Laboratory	$ 1,075	$ 1,080	$ 1,130	+ 5
Oak Ridge National Laboratory	$ 855	$ 860	$ 950	+ 10

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Nuclear Theory	Emphasize investigation of quark- gluon description of nuclear structure and of very high energy density forms of nuclear matter in preparation for future experimental investigations at the Continuous Electron Beam Accelerator Facility (CEBAF) and a future Relativistic Heavy Ion Collider (RHIC). Do calculations to better understand nuclear astrophysical processes including the emission and properties of neutrinos. Carry out preliminary activities aimed at the establishment of a Nuclear Theory Institute selected from several competing proposals. Continue broad program of theoretical research on properties of atomic nuclei, understanding of nuclear forces, and phase transitions in nuclear matter.	Build the research efforts specifically aimed at providing needed theoretical understanding in preparation for new experimental results from the Continuous Electron Beam Accelerator Facility (CEBAF) and a future Relativistic Heavy Ion Collider (RHIC). Continue a broad program of theoretical research on properties of atomic nuclei ranging among the underlying quark-gluon substructure of nuclear matter, understanding of nuclear forces, both at the nucleon-nucleon level as well as within the nucleus as a whole (such as neutron-proton interaction effects). Commence operation of a Nuclear Theory Institute of broad scope and national character that has been sited at the University of Washington. The Institute will serve as a center for excellence in nuclear theory and provide mechanisms for determining and carrying out research of highest national priorities. The Institute will provide focus and emphasis for the dispersed individual efforts in nuclear theory as these research programs seek to coalesce in addressing the problems at the forefront of the field.	Continue new research efforts in preparation for future experimental results from the Continuous Electron Beam Accelerator Facility (CEBAF) and the Relativistic Heavy Ion Collider (RHIC). These efforts are emphasizing the description of nuclei in terms of the underlying quark-gluon substructure of nuclear matter, including understanding of nuclear forces and phase transitions in nuclear matter. Develop forefront programs at the new Nuclear Theory Institute at the University of Washington. Create new Institute mechanisms for effective interaction with the entire nuclear physics community. Continue broad program of theoretical research on properties of atomic nuclei, understanding of nuclear forces, and expend the understanding of the forces at play in neutron proton interactions and symmetries in nuclei. Establish task oriented activities at national laboratories such as BNL and LBL which will address high impact problems such as RHIC related physics and the theory of chaos.
	$ 10,818	$ 12,226	$ 13,500
Nuclear Theory	$ 10,818	$ 12,226	$ 13,500

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GENERAL SCIENCE AND RESEARCH
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR PHYSICS

I. Preface: Capital Equipment

Capital equipment funds are needed to provide for particle detection systems, for data acquisition and analysis systems, and for instrumentation to improve performance of Nuclear Physics accelerators. These funds are essential for effective utilization of the national accelerator facilities operated by the Nuclear Physics program. In addition, the program has landlord responsibility for providing general purpose capital equipment at the Lawrence Berkeley Laboratory.

II. A. Summary Table: Capital Equipment

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
BNL	$ 4,300	$ 3,274	$ 2,775	- 15
LBL	2,755	2,761	1,775	- 36
LANL	3,335	2,840	2,900	+ 2
ANL	1,900	3,096	1,255	- 59
MIT/Bates	1,250	1,542	1,610	+ 4
ORNL	1,130	1,675	972	- 42
CEBAF	1,000	1,479	3,000	+103
University Laboratories	1,295	1,179	1,050	- 11
Sudbury Neutrino Observatory	0	0	2,776	>999
Gammasphere	0	0	5,500	>999
Lawrence Berkeley Laboratory - GPE	1,400	1,479	1,600	+ 8
Other	135	395	1,487	+276
Total, Capital Equipment	$ 18,500	$ 19,720	$ 26,700	+ 35

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory	$ 1,900	$ 3,096	$ 1,255	- 59
Brookhaven National Laboratory	$ 4,300	$ 3,274	$ 2,775	- 15
Lawrence Berkeley National Laboratory	$ 2,755	$ 2,761	$ 1,775	- 36
Los Alamos National Scientific Laboratory	$ 3,355	$ 2,840	$ 2,900	+ 2
Continuous Electron Beam Accelerator Facility	$ 1,000	$ 1,479	$ 3,000	+103
Gammasphere	$ 0	$ 0	$ 5,500	>999
Massachusetts Institute of Technology	$ 1,250	$ 1,542	$ 1,610	+ 4
Oak Ridge National Laboratory	$ 1,130	$ 1,675	$ 972	- 42
Sudbury Neutrino Observatory	$ 0	$ 0	$ 2,776	>999

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Capital Equipment			
BNL	For AGS heavy ion experiment E814, complete installation of the detector system, including the participant calorimeter, tracking chambers and uranium calorimeters, and begin first runs with complete system. Complete construction of the time projection chamber for E810. Provide partial support for a tunnel by-pass to bring heavy ion beams from the Tandem directly to the AGS Booster. At the laser-electron gamma source (LEGS) complete installation of equipment necessary for the first experiment, the photodisintegration of the deuteron. For the kaon beam line, complete fabrication of the electrostatic separators and magnetic elements. Complete modernization of central computer at NNDC.	Begin upgrade of AGS heavy ion experiments to prepare for higher multiplicities from gold beams expected upon completetion of the booster synchrotron. Complete implementation of Tandem/AGS heavy ion by-pass tunnel. At LEGS complete high-energy gamma detector for the E2/M1 experiments and begin construction of neutron detectors for neutron polarizability measurements. At the kaon beam line complete fabrication of components for production target area and install all components.	Continue updating of AGS heavy ion experiments to handle experiments with gold beams. This includes higher segmentation to accommodate the expected high multiplicities, more elaborate trigger schemes, and faster processing times. At LEGS complete neutron detectors necessary for the polarizability measurements.
	$ 4,300	$ 3,274	$ 2,775
LBL	Continue construction of a time projection chamber (TPC) for the HISS spectrometer to measure central collisions with the heavy ion beams from the Bevalac. For the intermediate-energy reaction program at the Bevalac, construct a large scattering chamber with the capability for long flight paths in the forward direction. Install ultra-fast data analysis computer for gamma-ray experiments at the 88" Cyclotron.	Complete construction of the HISS TPC. The microelectronics for the 15,360 pickup pads will be placed entirely on the detector, a new concept that permits the direct measurement of dE/dx from the pad signals. Upgrade the high multiplicity capability of the dilepton spectrometer for the study of heavy mass systems. Replace two VAX computers with a modern file server computer and 15 scientific workstations.	Complete testing of the HISS TPC and begin research program to understand collision dynamics that involve nuclear matter under extreme conditions. Procure data analysis center for 3D detectors with fast array processors and high-performance color graphics. Construct a 4-pi multifragment detector for intermediate energy studies at the Bevalac.
	$ 2,755	$ 2,781	$ 1,775

III. Capital Equipment (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
LANL	Continue construction of the Muon Electron Gamma-ray experiment (MEGA), which measures a very rare decay mode of the muon. This includes installation of beam hardware, positron and photon pair production scintillators, and trigger electronics. Begin construction of the pion beam energy-spread compressor for the low energy pion channel, which will generate a five-fold increase in yield for important pion experiments. This device uses a single-cell superconducting RF cavity.	Begin preliminary experimental runs with MEGA. For the pion beam energy-spread compressor, procure cryogenic refrigerator and perform full-power RF tests. Conduct preliminary experiments with enhanced pion beams that will shed light on the poorly understood transparency of the nucleus to 50-100 MeV pion beams. Procure equipment that enhances data acquisition and analysis capability through greater use of remote computing and computer workstations.	Construct a Neutral Meson Spectrometer, which achieves greatly improved energy resolution over present experiments. The ability to resolve discrete final states is crucial for the understanding the pion-nucleus interaction. Begin full experimental program with the pion beam energy-spread compressor. Modernize accelerator control system by installing equipment for distributed computer processing and networking.
	$ 3,335	$ 2,840	$ 2,900
ANL	Complete construction of the Fragment Mass Analyzer (FMA) for highly selective detection of rare particles from heavy ion reactions at ATLAS. The main ion-optical element will be delivered in 1989.	Begin construction of an electron-positron experiment, APEX, which exploits the high-intensity heavy-mass beams expected to be available from the ATLAS positive ion injector in FY 1991. This second-generation experiment will study the origin of sharp electron-positron coincident peaks observed at the German GSI laboratory in collisions of very heavy ions near the Coulomb barrier. Begin ion-optical studies of FMA using radioactive sources and the ATLAS beam.	Complete the final stage of construction of APEX, and begin preliminary experiments with beam to check operation and to measure background. Begin experiments with the FMA on a regular basis, some of which will be conducted with Compton-suppressed Ge detectors surrounding the target.
	$ 1,900	$ 3,096	$ 1,255
MIT/Bates	At the MIT/Bates Linear Accelerator Center procure beam line vacuum components, magnet power supplies, and cableing for the South Hall Ring Experiment (SHRE), fabricate detector system for the out-of-place spectrometer, and improve the polarized electron source to increase source lifetime.	At MIT/Bates provide additional vacuum components, accelerator controls, beam monitoring equipment, more cableing and radiation safety equipment for the SHRE, and continue work on out-of-plane spectrometer and polarized electron source. Initiate construction of internal target for South Hall Ring Experiment.	At MIT/Bates procure RF equipment (klystrons, modulators and drivers) for the SHRE to compensate for energy loss due to synchrotron radiation, control instrumentation for the linac, and further components for the polarized electron source. Continue construction of internal target for South Hall Ring Experiment.
	$ 1,250	$ 1,542	$ 1,610

III. Capital Equipment (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
ORNL	At ORNL, receive delivery of the major portion of an array of BaF2 detectors and dedicated electronics for detection of energetic photons from medium-energy heavy ion reactions. Initiate construction of a recoil mass spectrometer (RMS). The RMS is particularly useful for the study of low cross section reaction products from inverse heavy ion reactions.	At ORNL, continue construction of the RMS with component fabrication and assembly under way. Upgrade HHIRF computer system with ACP farm for general data processing. Purchase BGO detectors for CERN heavy ion experiment WA-80. Procure replacement klystrons for ORELA.	At ORNL, continue upgrade of computer system with additional distributed processors and work stations. At ORELA, continue procurement of replacement klystrons.
	$ 1,130	$ 1,675	$ 972
CEBAF	Upgrade the VAX 8700 and 785 computer systems to 30 MFLOP capacity to support extensive simulations of experimental equipment and accelerator components. Procure a magnet measurement system, shop equipment, and cryogenic support equipment.	Continue upgrade of computer systems with additional memory, disk drives and tape units. Procure precision equipment for proper alignment of beam lines.	Begin construction of apparatus for the experimental research program at CEBAF. Continue upgrade of computer systems with additional CPUs and work stations. Procure electronic measurement equipment for use with RF systems. Procure data acquisition electronics, CAMAC and Fastbus, for experimental efforts.
	$ 1,000	$ 1,479	$ 3,000
University Laboratories	Continue upgrade of instrumentation at university laboratories. Construct experimental equipment as follows: Texas A&M University (partial funding for momentum achromat recoil spectrometer and barium fluoride detector system), TUNL (expanded data acquisition and analysis facility), University of Washington (barium fluoride and germanium gamma-ray detectors), and Yale University (BGO multiplicity filter and a trigger processor system).	Continue instrumentation upgrade at university laboratories with construction of equipment as follows: Texas A&M University (complete funding for momentum achromat recoil spectrometer and barium fluoride detector system), TUNL (new charging system and stripper for the tandem accelerator), University of Washington (complete funding of gamma-ray detector system), Yale University (a terminal stripper and charge-state separator for the tandem accelerator, and a segmented large solid angle silicon detector array).	Continue instrumentation initiative at university accelerator laboratories to increase amount of available experimental equipment.
	$ 1,295	$ 1,179	$ 1,050

III. Capital Equipment (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Sudbury Neutrino Observatory	No activity.	No activity.	Begin fabrication of the Sudbury Neutrino Observatory, an observatory for neutrino astrophysics, a collaborative Canadian, U.S. and U.K. project. The observatory will make use of heavy water as its principal sensitive medium, and will be located in a deep underground mine at Sudbury, Ontario. The unique world-class facility has a very high potential for fundamental discoveries in solar physics and for fundamental properties of neutrinos. NSAC enthusiastically recommended that the project be funded immediately. Of the approximately $41 million TEC, the U.S. share would be about $10.6 million.
	$ 0	$ 0	$ 2,778
Gammasphere	No activity.	No activity.	Initiate fabrication of Gammasphere, a world-class high-resolution gamma-ray facility for the study of nuclear structure at high angular momentum, finite temperature and large deformation. Gammasphere is specially designed to observe high-multiplicity coincidence events which are crucially important for the analysis of complex gamma-ray spectra. Five-fold coincidence events will be 8000 times more intense than any existing high resolution detector system. The system consists of 110 large Compton suppressed germanium detectors. The instrument can address a broad range of nuclear physics such as superdeformed nuclei, damping, giant resonances, symmetries in nuclei, correlations in nuclear reactions, fundamental interactions, and certain astrophysics questions. Gammasphere has an estimated total cost of about $17 million. NSAC assigned very high priority to Gammasphere and recommended

III. Capital Equipment (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Gammasphere (Cont d)			that the project be funded. A review panel recommended siting Gammasphere at Oak Ridge National Laboratory.
	$ 0	$ 0	$ 5,500
Lawrence Berkeley Laboratory - GPE	Provide general purpose equipment at Lawrence Berkeley Laboratory, for which the Nuclear Physics program has landlord responsibility, such as a firetruck and forklifts for the Motor Vehicle group, disk drives for the Administration Division computer, refrigerators and freezers for the cafeteria, optical mass storage system for the Central Computing Facility, high temperature kiln and a scatter plate interferometer for the Engineering Division.	Provide general purpose equipment such as light and heavy trucks for the Motor Vehicle group; cooling towers, boilers, chillers, a CAD system and data processing equipment for the Administrative Division; and equipment used for printing, graphics and photography, and equipment for lab-wide computer networks for the Information and Computing Sciences Division.	Provide general purpose equipment such as trucks, forklifts and a bus for the Motor Vehicle group; cartridge tape controllers and drives, ultrasonic crack detectors for the Administrative Division; and pool of scientific work stations and related servers, lab-wide network accessible printing system, fiber optics computer network lines, disk upgrade for the central computing facility, and a postscript typesetter for the Information and Computing Science Division.
	$ 1,400	$ 1,479	$ 1,600
Other	Provide equipment for the on-line isotope separator at Oak Ridge (UNISOR) program and some participants of the nuclear data measurements program.	Provide equipment for the UNISOR program and some participants of the nuclear data measurements program.	Provide equipment for the UNISOR program, some participants of the nuclear data measurements program, computing equipment at the Nuclear Theory Institute, and more rapid completion of selected experimental systems in the medium energy and heavy ion research program.
	$ 135	$ 395	$ 1,487
Capital Equipment	$ 18,500	$ 19,720	$ 26,700

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KEY ACTIVITY SUMMARY

NUCLEAR PHYSICS

I. Preface: Construction

II. A. Summary Table: Construction

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Continuous Electron Beam Accelerator Facility (CEBAF)	$ 44,500	$ 62,811	$ 65,000	+ 4
Relativistic Heavy Ion Collider (RHIC)	0	0	15,000	>999
Accelerator Improvements and Modifications	4,300	4,536	4,300	- 5
General Plant Projects	3,700	4,338	4,200	- 3
Total, Construction	$ 52,500	$ 71,485	$ 88,500	+ 24

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Construction			
Continuous Electron Beam Accelerator Facility (CEBAF)	Continue construction of accelerator enclosure. Complete construction of CEBAF Center. Begin procurement of accelerator cavities and klystrons. Begin procurement of cryostats.	Begin end station construction. Continue construction of accelerator enclosure. Continue procurement of cavities and cryostats. Procure arc magnets and power supplies. Begin procurement of experimental equipment.	Continue end station construction and fabrication of research equipment. Continue fabrication of cavities and cryostats. Continue procurement of arc magnets and power supplies. Assemble, test, and install components.
	$ 44,500	$ 62,611	$ 65,000
Relativistic Heavy Ion Collider (RHIC)	No activity.	No activity.	Start construction of RHIC with emphasis on production of superconducting dipole, quadrupole, and sextupole magnets for the accelerator arcs. Initiate procurement of long-lead time items for vacuum, cryogenic and beam instrumentation systems.
	$ 0	$ 0	$ 15,000
Accelerator Improvements and Modifications	Essential modifications and upgrades on an annual basis to maintain and improve the reliability and efficiency of accelerators and experimental facilities. Annual AIP expenditure is less than 1% of total Federal investment in these facilities.	Approximately same level of effort as FY 1989.	Approximately same level of effort as FY 1989.
	$ 4,300	$ 4,536	$ 4,300
General Plant Projects	Essential additions, modifications, and improvements on an annual basis to maintain safety and effectiveness of general laboratory plant and support facilities.	Somewhat higher level of effort due to special needs of programmatic facilities.	Approximately same level of effort as FY 1990.
	$ 3,700	$ 4,338	$ 4,200
Construction	$ 52,500	$ 71,485	$ 88,500

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KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Nuclear Physics

IV. A. Construction Project Summary

Project No.	Project Title	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Unappropriated Balance	TEC
GPE-360	General Plant Projects	$ ---	$ 4,338	$ 4,200	$ ---	$ 4,200
91-G-301	Accelerator Improvements and Modifications	---	4,538	4,300	---	4,300
91-G-300	Relativistic Heavy Ion Collider	---	---	15,000	382,000	397,000
87-R-203	Continuous Electron Beam Accelerator Facility	94,200	62,611	65,000	43,100	265,000
Total, Nuclear Physics Construction		$ 94,200	$ 71,485	$ 88,500	$425,100	

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Physics

IV. B. Plant Funded Construction Project

1. Project title and location: GPE-300 General Plant Projects
Various locations

Project TEC: $ 4,200
Start Date: 2nd Qtr. FY 1991
Completion Date: 2nd Qtr. FY 1993

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1991	$ 4,200	$ 4,200	$ 1,200
1992	0	0	2,000
1993	0	0	1,000

3. Narrative:

(a) General Plant Projects provide for the many miscellaneous alterations, additions, modifications, replacements, and non-major construction required at the Lawrence Berkeley Laboratory, and the Massachusetts Institute of Technology (Bates Linear Accelerator Center). GPP projects focus on general laboratory facilities whereas the AIP projects focus on the technical facilities.

(b) These projects are required for the general maintenance, modification and improvement of the overall laboratory plant and include minor new construction, capital alterations and additions, and improvements to buildings and utility systems. These projects are essential for maintaining the productivity, increasing the operational cost effectiveness, and ensuring that necessary support services are available to the research program at the DOE-owned facilities.

(c) A description and listing of the major items of work to be performed at the various locations is contained in the Construction Project Data Sheets. Some of these may be located on non-Government owned property. The following is a list of the proposed FY 1991 funding for the various locations:

Lawrence Berkeley Laboratory	$ 2,900
Los Alamos National Laboratory (Clinton P. Anderson Meson Physics Facility)	200
Massachusetts Institute of Technology (Bates Linear Accelerator Center)	1,100
Total Estimated Cost.....	$ 4,200

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 4,200	$ 0
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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FY 1991 CONGRESSIONAL BUDGET REQUEST
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GENERAL SCIENCE AND RESEARCH
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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Physics

IV. B. Plant Funded Construction Project

1. Project title and location: 91-G-301 Accelerator Improvements and Modifications
Various locations

Project TEC: $ 4,300
Start Date: 2nd Qtr. FY 1991
Completion Date: 2nd Qtr. FY 1993

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1991	$ 4,300	$ 4,300	$ 3,000
1992	0	0	1,000
1993	0	0	300

3. Narrative:

(a) Accelerator Improvement Projects provide for additions, modifications, and improvements to research accelerators and ancillary experimental facilities. The requested projects are necessary to maintain and improve reliability and efficiency of operations and to provide new experimental capabilities as required for execution of planned nuclear physics research programs. Funds for these projects are needed annually to provide increased performance levels and increased serviceability, thereby decreasing facility downtime, improving the productivity and cost effectiveness of the program.

(b) A description and listing of the major items of work to be performed at the various locations is contained in the Construction Project Data Sheets. Some of these may be located on non-Government owned property. The following is a list of the proposed FY 1991 funding for the various locations:

Argonne National Laboratory (ATLAS)	$ 150
Brookhaven National Laboratory (AGS/Tandem)	1,500
Lawrence Berkeley Laboratory	1,100
Los Alamos National Laboratory (Clinton P. Anderson Meson Physics Facility)	500
Massachusetts Institute of Technology (Bates Linear Accelerator Center)	850
Oak Ridge National Laboratory (Holifield Heavy Ion Research Facility)	200
Total Estimated Costs.....	$ 4,300

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$ 4,300	$ 0
Capital Equipment	0	0	0	0	0
Operating Expenses	0	0	0	0	0

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Nuclear Physics

IV. C. Plant Funded Construction Project

1. Project title and location: 91-G-300 Relativistic Heavy Ion Collider
Brookhaven National Laboratory
Upton, New York

Project TEC: $ 397,000
Start Date: 2nd Qtr. FY 1991
Completion Date: 3rd Qtr. FY 1997

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1991	$ 15,000	$ 15,000	$10,000
1992	50,000	50,000	38,400
1993	80,000	80,000	70,000
1994	90,000	90,000	86,600
1995	90,000	90,000	90,000
1996	72,000	72,000	78,000
1997	0	0	24,000

3. Narrative:

(a) The Relativistic Heavy Ion Collider (RHIC) facility will be a unique, world-class research facility with opposing colliding beams that provide collision energies of 100 GeV/AMU per beam for heavy ions as massive as gold. RHIC will use the existing Alternating Gradient Synchrotron (AGS) and Tandem Van de Graaff complex as an injector. The new accelerator will be built in the existing Colliding Beam Accelerator (CBA) tunnel (3.8 km circumference) at BNL, and will utilize the experimental halls, support building, and liquid helium refrigerator from the partially completed CBA project.

(b) RHIC will be dedicated to the study of nuclear matter at very high temperatures and densities where the quark-gluon degrees of freedom are expected to be directly revealed. The machine will accelerate ions with atomic masses spanning the periodic table, with the collision energies of 100 GeV/AMU for the heaviest ions, and even high energies for lighter ions. In such collisions, experimenters will be able to study extended volumes of hadronic matter with energy densities more than ten times that of the nuclear ground state, thus creating in the laboratory conditions that are similar to those of the expanding universe moments after the Big Bang. Ultra-relativistic heavy ion collisions are probably the only means of producing such energy densities under controlled laboratory

conditions, and offer a unique avenue for both nuclear and particle physicists to test theories of the strong interaction at the high energy density limit. This is the threshold at which hadronic matter is predicted to lose its identity as a collection of neutrons and protons, and to undergo a phase transition to a plasma of quarks and gluons.

(c) Construction of RHIC will proceed in an expeditious manner, consistent with available funds. FY 1991 construction funds will be used for fabrication of arc magnets and directly related items. In other areas, only systems engineering will be carried on during the first year of the project.

4. Total Project Funding (BA):

	Prior Years	FY 1989	FY 1990	FY 1991 Request	To Complete
Construction	$ 0	$ 0	$ 0	$15,000	$382,000
Capital Equipment	0	0	0	0	0
Operating Expenses	8,800	6,200	6,450	8,800	71,850

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KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY
Nuclear Physics

IV. B. Plant Funded Construction Project

1. Project title and location: 87-R-203 Continuous Electron Beam Accelerator Facility
Newport News, Virginia

Project TEC: $265,000
Start Date: 2nd Qtr. FY 1987
Completion Date: 4th Qtr. FY 1993

2. Financial schedule:

Fiscal Year	Appropriated	Obligations	Costs
1987	$ 16,200	$ 16,200	$ 7,842
1988	33,500	33,500	41,858
1989	44,500	44,500	29,086
1990	62,611	62,611	62,000
1991	65,000	65,000	63,000
1992	38,189	38,189	40,000
1993	5,000	5,000	12,214

3. Narrative:

(a) The Continuous Electron Beam Accelerator Facility (CEBAF) is a single purpose, basic nuclear physics research facility based on a four billion electron volt (GeV) electron linear accelerator that is capable of providing high intensity, continuous (i.e., not pulsed) electron beams. The facility will include the experimental areas needed to conduct basic nuclear research, and buildings to house the accelerator complex and its operation and maintenance activities. The facility will possess a complement of equipment for initial experiments and supporting facilities to exploit the capabilities of the accelerator.

(b) CEBAF will be the only facility in the world capable of producing electron beams that simultaneously meet the criteria of high energy, high intensity, and continuous nature necessary to advance the frontiers of nuclear physics. CEBAF's electron accelerator with its capability of providing beams at any energy in the range 0.5 to 4 GeV, is designed to study the largely unexplored transition between the nucleon-meson and the quark-gluon description of nuclear matter.

(c) Construction of CEBAF will continue in an expeditious manner, consistent with available funds. FY 1990 construction funds will be used for major hardware fabrication of RF cavities, cryounits, the central helium liquifier and its transfer lines, and the linac and arc magnets. Also, construction of the beam enclosure tunnel and support structures will continue.

4. Total Project Funding (BA):

	Prior Years	FY 1988	FY 1990	FY 1991 Request	To Complete
Construction	$49,700	$44,500	$62,611	$65,000	$43,189
Capital Equipment	0	0	0	0	0
Operating Expenses	21,918	6,000	4,000	4,029	2,800

DEPARTMENT OF ENERGY
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GENERAL SCIENCE AND RESEARCH

OVERVIEW

GENERAL SCIENCE PROGRAM DIRECTION

This program provides the Federal staffing resources and associated funding to plan, direct, and manage a viable, high quality national program of basic research in the fields of high energy physics and nuclear physics in support of the Nation's goals to support basic research and development and to maintain U.S. competitiveness. It supports the staff in the Office of the Associate Director for High Energy and Nuclear Physics, the High Energy Physics Division, the Nuclear Physics Division, and associated program and management support staff required to administer these programs.

The Department of Energy provides over 90 percent of the Federal support, and serves as the Executive Agent, for the Nation's High Energy Physics programs. Over 35 percent of the total Federal support of basic nuclear physics research is provided through the Nuclear Physics program. The staff develops program plans and provides for budget justification and execution. It supports, plans, and provides for construction, maintenance, and operation of the large facilities on which research in high energy physics and nuclear physics depends. It oversees the operation of large and complex accelerator facilities which are used by qualified physicists throughout the Nation, provides technical oversight of the high energy physics and nuclear physics research programs at 15 major laboratories and well over one hundred universities throughout the nation, and interacts with other Federal agencies. In carrying out these responsibilities, the staff funded by General Science Program Direction assesses the basic research needs of these programs with the advice and assistance of the High Energy Physics Advisory Panel (HEPAP) and the DOE/NSF Nuclear Science Advisory Committee (NSAC), participates actively in their meetings and subpanel studies, and provides administrative support for their operation. This staff works in close cooperation with the Office of Superconducting Super Collider (OSSC), since the SSC is an integral part of the High Energy Physics program.

This staff also participates extensively in international collaboration and cooperative programs with Japan, W. Germany, CERN Laboratory (Geneva, Switzerland) member countries, China, the Soviet Union, Spain, Italy, and Canada.

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LEAD TABLE

General Science Program Direction

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs Base	
					Dollar	Percent
General Science Program Direction						
Operating Expenses.....	$2,635 a/	$3,008 a/b/	$3,950	$3,950	--	--
Staffing (FTE's).....	39	46 c/	46	46		

Authorization: Section 209, P.L. 95-91.

a/ Reflects comparability adjustments of $522,000 in FY 1989 and $838,000 in FY 1990 to Superconducting Super Collider Program Direction.
b/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.
c/ Revised request.

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SUMMARY OF CHANGES

General Science Program Direction

FY 1990 Appropriation	$ 3,008
Adjustments - Increased personnel costs	+ 942
FY 1991 Base and Congressional Budget Request	$ 3,950

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KEY ACTIVITY SUMMARY

GENERAL SCIENCE PROGRAM DIRECTION

I. Preface: General Science Program Direction

This program provides the Federal staffing resources and associated funding to plan, direct, and manage a viable high quality national program of basic research in the fields of high energy physics and nuclear physics to ensure U.S. competitiveness in basic research. It supports the staff in the Office of the Associate Director for High Energy and Nuclear Physics, the High Energy Physics Division, the Nuclear Physics Division, and associated program and management support staff required to administer these programs.

II. A. Summary Table: General Science Program Direction

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
General Science Program Direction	$ 2,635	$ 3,008	$ 3,950	+ 31
Total, General Science Program Direction	$ 2,635	$ 3,008	$ 3,950	+ 31

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
General Science Program Direction	Provided funds for salaries, benefits, and travel for 39 full-time equivalents (FTE's) in the Office of High Energy and Nuclear Physics and for related program and management support staff. ($2,610)	Provide funds for salaries, benefits, and travel for 39 FTE's included in the FY 1990 budget including normal increased personnel costs. A revised request for seven additional FTE's is discussed below. $3x are associated with increased environment, safety and health (ES&H) responsibilities and one will provide increased support in the Office of High Energy and Nuclear Physics. ($2,848)	Provide funds for salaries, benefits, and travel for 46 FTE's. Provide for seven additional FTE's over the FY 1990 budget level, as discussed in FY 1990. Also provide increased personnel costs resulting, for example, from within-grade and merit increases and the impact of the FY 1990 general and executive pay raises. ($3,765)
	The High Energy Physics staff provided continued oversight of a $550 million budget and of high energy accelerator centers at Brookhaven National Laboratory, Fermilab, and the Stanford Linear Accelerator Center. Provided technical oversight for high energy physics research programs at nine major laboratories, managed more than 100 university research tasks, and provided technical and project management oversight for three major construction projects and three major detectors. Provided effective DOE oversight for new facilities at the laboratories whose operating time and experiments increased. Continued to oversee fabrication of further new detectors for effective utilization of new facilities, as well as construction of the AGS Accumulator/Booster, the Fermilab computing upgrade and two major detectors, the SLD at SLAC and the DO at Fermilab. The staff also participated with foreign countries in oversight of the L3 detector at CERN.	Provide continued oversight of the High Energy Physics program excluding primary responsibility for SSC. However, the staff will maintain close coordination with the SSC staff on all SSC program activities since SSC is being built to perform high energy physics research. Provide one additional FTE for increased line management responsibilities for compliance with ES&H regulations at large accelerator facilities. Includes appraisal of contractor ES&H performance and ensuring safe disposal of byproducts and wastes. Utilization of existing facilities, particularly the Tevatron and SLC, will increase. Advanced accelerator R&D will increase to support test-bed exploration of very promising new concepts and to increase productivity of new facilities. Efforts on the two major detectors at SLAC and Fermilab will move into the debug and initial operation phase, and the staff will continue to oversee a shared effort with foreign countries on the L3 detector.	Provide continued oversight of the High Energy Physics Program at the FY 1990 revised request level of effort which includes one additional FTE. Continue close liaison on SSC program activities. Continue to oversee the safe and efficient operation and strong utilization of existing facilities, including the Tevatron and SLC, and research capabilities. Oversee experimental and theoretical research carried out by university based scientists. Continue oversight of test-bed exploration of very promising new advanced accelerator concepts. Maintain foreign liaison for conduct of experiments at foreign accelerators with unique capabilities not available in the U.S. and for oversight of the L3 detector. Oversee continuation of the Fermilab Linac Upgrade Project.

III. General Science Program Direction (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
General Science Program Direction (Cont'd)	The Nuclear Physics staff provided continued oversight of a $258 million budget and seven large and complex national accelerator facilities. Provided technical oversight for nuclear physics research programs at 13 major laboratories, managed more than 100 university research tasks, and provided technical and project management oversight for five construction and major equipment projects. Managed R&D and monitored conventional construction activities related to the Continuous Electron Beam Accelerator Facility (CEBAF). Interacted with DOE, contractor, and other officials on the complex arrangements involved in establishing a new laboratory/accelerator facility. Managed Nuclear Data program. Continued planning and R&D for the Relativistic Heavy Ion Collider (RHIC).	Provide oversight of the Nuclear Physics program which includes increased user facility utilization. Provide one additional FTE for increased line management responsibilities for compliance with ES&H regulations and other increased workloads. Includes appraisal of contractor ES&H performance and ensuring safe disposal of byproducts and wastes. CEBAF construction is increased and is at the point of critical decisions in the area of procurement of high technology and experimental equipment. Substantially increased effort will be needed to monitor new detector fabrication activities. There will be increased theory research activity leading to establishment of a theory institute; this enhanced program will focus on new scientific directions.	Provide oversight of the Nuclear Physics program at the FY 1990 revised request level of effort which includes one additional FTE. Provide continued management oversight of complex accelerator facilities. Support increased R&D, construction and pre-operation activities for CEBAF. Support RHIC R&D and construction. Substantially increased effort will be needed for the RHIC project at BNL to supervise managerial enhancements, maintenance of safety and environmental standards, industrialization of superconducting magnet components, development and fabrication of detectors, and general adherence to cost and schedule baselines. Support R&D at university facilities and optimize research programs at facilities which were recently upgraded. Oversee a significant university user experimental research program, and manage the Nuclear Data program in support of various DOE programs. Continue to support theoretical research which includes beginning a nuclear theory institute for advanced concepts.
	Provided program and management support in the areas of budget and finance, personnel administration, acquisition and assistance, construction, environment and safety. Supported the SSC Site Task Force (STF).	Provide four additional FTE's to provide program and management support at an acceptable level. Independent ES&H oversight capability will be enhanced to carry out increased responsibilities for nuclear safety, health physics, occupational safety and industrial hygiene, environmental protection, hazardous waste management, safeguards and security, emergency preparedness, and quality assurance. Perform safety appraisals and environmental compliance audits at large accelerator facilities.	Provide program and management support at the FY 1990 revised request level which includes four additional FTE's.

III. General Science Program Direction (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
General Science Program Direction (Cont'd)	Provided program support such as printing, supplies and materials, advertising and contractual support. ($25)	Continue the variety of program support required in FY 1989. Increased funding will provide contractual support for the increasing environment, safety and health workload and provide support for Automated Office Support Systems workstations. ($160)	Continue at an increased level the variety of program support required in FY 1990. ($185)
	$ 2,635	$ 3,008	$ 3,950
General Science Program Direction	$ 2,635	$ 3,008	$ 3,950

VOLUME 3

URANIUM ENRICHMENT

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES

PROPOSED APPROPRIATION LANGUAGE

For expenses of the Department of Energy in connection with operating expenses; the purchase, construction, and acquisition of plant and capital equipment and other expenses incidental thereto necessary for uranium supply and enrichment activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; purchase of electricity to provide enrichment services or purchase of enriched uranium from [the Federal Republic of Germany] other sources of enriched uranium 1/ whichever will minimize appropriations; purchase of passenger motor vehicles (not to exceed [25] 60, of which 46 are for replacement only), [$1,431,000,000] $1,406,018,000, to remain available until expended: Provided, That revenues received by the Department for the enrichment of uranium and estimated to total [$1,500,900,000] $1,530,500,000 in fiscal year [1990] 1991, shall be retained and used for the specific purpose of offsetting costs incurred by the Department in providing uranium enrichment service activities as authorized by section 201 of Public Law 95-238, notwithstanding the provisions of section 3302(b) of title 31, United States Code: Provided further, That the first $50,000,000 of revenues so retained be transferred to an account established in Treasury to fund the decontamination and decommissioning of uranium enrichment facilities. 2/ Provided further, That the sum herein appropriated shall be reduced as uranium enrichment revenues are received during fiscal year [1990] 1991 so as to result in a final fiscal year [1990] 1991 appropriation estimated at not more than $0. 3/

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Explanation of Change

1/ Adds language that would allow the Department to purchase enrichment services at prices below the Department's cost of production. This will enable the Department to reduce costs and help maintain competitive prices.

2/ Adds language that would provide for transfer of revenues to a new decontamination and decommissioning fund account in the Treasury. Similar provisions are included in the Corporation legislation. The Department believes funds should be set aside for eventual use to decontaminate and decommission the enrichment facilities.

3/ Deletes language contained in Public Law 101-101 which had specific application to fiscal year 1990. The language is not required for the fiscal year 1991 budget proposal.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES

OVERVIEW

URANIUM ENRICHMENT

The mission of the uranium enrichment enterprise, as a business within the United States Government, is to produce and sell uranium enrichment services worldwide. The enterprise provides the greatest possible value to its customers while fulfilling its environmental, social, and security responsibilities. It is dedicated to strive constantly toward excellence in performance while maintaining the highest standards.

The enterprise provides and markets uranium enrichment services worldwide to meet the needs of commercial customers. It also provides these services to meet the enrichment requirements of the United States Government. The enterprise will continue to provide competitive prices and improved value to customers through the efficient use of current technology and the development of new technologies.

Achieving this overall mission will be accomplished in a manner that also achieves the National goals of: 1) health, safety and a clean environment, 2) energy security, 3) scientific and technological competitiveness, 4) National defense, and 5) other goals, including payment to the Treasury, and contribution to the U.S. balance of payments.

The gaseous diffusion operations and support program, which provides enrichment services through operation of the two gaseous diffusion plants located at Portsmouth, Ohio and Paducah, Kentucky, is planned, funded, and conducted in a manner that contributes primarily to achievement of the National goals of energy security, National defense, and health, safety and a clean environment.

The Atomic Vapor Laser Isotope Separation program, which is focused on demonstrating the laser enrichment technology at the end of FY 1992, is conducted for the purpose of developing enrichment technology that may provide an economical alternative to the gaseous diffusion technology and achieves the National goal of maintaining or improving the scientific and technological competitiveness.

The achievement of the National goal of health, safety and a clean environment primarily involves the corrective actions, environmental restoration, and waste management programs. The corrective actions program includes activities required to bring active and standby facilities into compliance with air, water, and solid waste regulatory requirements, agreements and applicable DOE Order requirements at the active gaseous diffusion facilities; the environmental restoration program primarily involves remedial actions required at

all inactive/surplus facilities and sites contaminated with radioactive, hazardous, or mixed wastes; the waste management program includes the activities connected with minimization, treatment, storage, and disposal of all radioactive, hazardous, or mixed wastes generated as a result of ongoing operations at active facilities at the gaseous diffusion plant sites. The FY 1991 budget for these environmental activities is based on funding activities in the Environmental Restoration and Waste Management Five-Year Plan with priority 1 through 3. In addition, the gaseous diffusion program includes the majority of health and safety activities. This includes efforts to improve the overall quality of the health and safety programs to levels of quality commensurate with the worldwide standard of excellence for commercial uranium fuel cycle facilities.

The proposed legislation to create a U.S. Uranium Enrichment Corporation creates new cost items including the establishment of an interest bearing uranium enrichment decontamination and decommissioning fund in the Treasury, and payment to the Treasury on Debt.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

LEAD TABLE

Uranium Enrichment Activities

Activity	FY 1989 Actual Appropriation	FY 1990 d/ Appropriation	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Gaseous Diffusion Operations and Support						
Operating Expenses	$ 988,003 a/	$ 1,145,541	$ 1,145,541	$ 1,077,700	-$67,841	-6
Capital Equipment	12,187	8,015	8,015	15,700	+7,685	+96
Construction	40,296	41,908	41,908	62,200	+20,292	+48
Subtotal	1,040,486	1,195,464	1,195,415	1,155,600	-39,864	-3
Atomic Vapor Laser Isotope Separation						
Operating Expenses	117,118 b/	123,280	123,280	146,500	+23,220	+19
Capital Equipment	5,000	7,995	7,995	5,600	-2,395	-30
Construction	3,400	987	987	2,400	+1,413	+143
Subtotal	125,518	132,262	132,262	154,500	+22,238	+17
Corrective Actions						
Operating Expenses	1,578	5,122	5,122	3,750	-1,372	-27
Capital Equipment	0	1,330	1,330	0	-1,330	-100
Construction	3,023	1,085	1,085	5,500	+4,415	+407
Subtotal	4,601	7,537	7,537	9,250	+1,713	+23
Environmental Restoration (Inactive Sites)						
Operating Expenses	46,180 c/	58,426 e/	58,426	67,419	+8,993	+15
Waste Management						
Operating Expenses	8,080	9,694	9,694	10,304	+610	+6
Capital Equipment	613	525	525	2,945	+2,420	+461
Construction	640	3,495	3,495	700	-2,795	-80
Subtotal	9,333	13,714	13,714	13,949	+235	+2

Activity	FY 1989 Actual Appropriation	FY 1990 d/ Appropriation	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Program Direction						
Operating Expenses.....	$ 4,000	$ 5,034	$ 5,034	$ 5,300	+$ 266	+5
Subtotal.....	1,230,118	1,412,437	1,412,437	1,406,018	-6,419	0
Payment to Treasury on Debt - OE..	0	0	0	29,000 f/	+29,000	NA
Funds Available for Dividends/ Working Capital - OE.....	0	0	0	45,482 f/	+45,482	NA
Uses of Prior Year - Construction.	-43,520	0	0	0	0	0
TOTAL, Uranium Enrichment Activities.....	1,186,598	1,412,437	1,412,437	1,480,500	+68,063	+5
Operating Expenses.....	1,164,959	1,347,097	1,347,097	1,385,455	+38,358	+3
Capital Equipment.....	17,800	17,865	17,865	24,245	+6,380	+36
Construction.....	3,839	47,475	47,475	70,800	+23,325	+49
Staffing (FTEs).....	62	67	67	67		

a/ Excludes an additional $20,000,000 provided via an appropriation transfer from the Departmental Administration appropriation account, and includes an additional $55,000,000 provided via a Supplemental appropriation for power purchases.
b/ Excludes $1,482,500 for the Small Business Innovative Research transfer.
c/ Includes $4,841,000 for project 89-N-502, General Plant Projects.
d/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.
e/ Includes $1,600,000 for project 90-N-502, General Plant Projects.
f/ The FY 1991 budget assumes the legislation to establish the United States Uranium Enrichment Corporation is enacted. If legislation is not passed creating the Uranium Enrichment Corporation, this item could be paid to the Treasury as a repayment on the Government's investment in uranium enrichment.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

SUMMARY OF CHANGES

Uranium Enrichment Activities

FY 1990 Appropriation	$1,412,437
Adjustments - Non-discretionary increases	0
FY 1991 Base	1,412,437

Gaseous Diffusion Operations and Support

- Operating expenses decreased $67,841,000 as follows: cost of purchased power increased $51,365,000 because of increases in the cost of electricity from the Department of Energy's power suppliers and the need to increase production by approximately 1.1 million separative work units in FY 1991 to meet projected sales requirements. Power capacity charges for Tennessee Valley Authority and the tax liability decreased $151,753,000. Additional operating funds totaling $32,547,000 are required for escalation and fringe benefits, together with additional personnel for higher power operations and for updating safety analyses, enhancing training, and increasing the health and safety conditions in the operating facilities. Capital equipment funds increased by $7,685,000 to purchase three new major items of equipment and other laboratory and process equipment. Construction increased $20,292,000 primarily to continue six projects begun in previous years and to initiate five new FY 1991 projects associated with plant maintenance, safeguards and security, and process improvements. ..... -39,864

Atomic Vapor Laser Isotope Separation (AVLIS)

- The increase of $23,238,000 is necessary to carry out the technology demonstration by the end of FY 1992. The technology demonstration requires installation and startup of additional laser separator equipment plus operations to carry out the demonstration. ..... +22,238

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

SUMMARY OF CHANGES

Uranium Enrichment Activities

Corrective Actions	
o The increase of $1,713,000 is associated with conduct of activities identified in the Environmental Restoration and Waste Management Five-Year Plan with priority 1 through 3, and is primarily related to the initiation of a new construction project. This project will install over 100,000 troughs beneath exhaust ventilation ducts to collect PCB-contaminated oil that is leaking through the duct gaskets.	$ +1,713
Environmental Restoration	
o The increase of $8,993,000 is associated with conduct of activities identified in the Environmental Restoration and Waste Management Five-Year Plan with priority 1 through 3, including characterization and remediation of offsite contamination at Paducah and onsite contamination at Portsmouth and Paducah.	+8,993
Waste Management	
o The increase of $235,000 is associated with conduct of activities identified in the Environmental Restoration and Waste Management Five-Year Plan with priority 1 through 3, including incineration of mixed wastes at the Toxic Substance Control Act Incinerator and the installation of a waste encapsulator at Portsmouth.	+235
Program Direction	
o The increase of $266,000 is primarily required to cover escalation for salaries and benefits.	+266

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

SUMMARY OF CHANGES

Uranium Enrichment Activities

Payment to Treasury on Debt - OE	
o Interest payment on the $364,000,000 debt in accordance with the proposed legislation.	+29,000
Funds Available for Dividends/Working Capital	
o The increase of $45,482,000 represents the amount of revenues that are not needed to meet program requirements.	+45,482
FY 1991 Congressional Budget Request	$1,480,500

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

URANIUM ENRICHMENT ACTIVITIES

1. Preface: Gaseous Diffusion Operations and Support

In achieving the National goals of Energy Security, National Defense, and Health, Safety and a Clean Environment, the principal objective of the Uranium Enrichment gaseous diffusion operations and support program is to provide for the safe and environmentally sound production of low cost enriched uranium from the gaseous diffusion plants (GDPs) located at Portsmouth, Ohio and Paducah, Kentucky. Since the cost of the electric power needed to drive the diffusion enrichment process comprises about 75 percent of the cost of production, the Uranium Enrichment program has focused over the past several years on minimizing these costs by finding ways to avoid the need for the power purchases and by assuring that the power which is purchased is the lowest cost that can be obtained. The success of these efforts is largely responsible for the fact that the Uranium Enrichment Program's factory costs in FY 1991 are expected to be approximately $75 per separative work unit (SWU) as compared to the $90 per SWU level which the program experienced in FY 1982.

Beginning in FY 1990, the program will no longer be able to utilize its enriched uranium inventory to meet its delivery requirements, since the inventory of enriched uranium will reach the minimum working level needed to provide product on a reliable basis. Thus, beginning in FY 1990, production will need to closely match deliveries and the program will need to budget annually for enough power to produce all of the enriched uranium needed to meet expected deliveries. Low cost power will continue to be obtained by the Department by its purchases of firm power under long-term contracts from the Ohio Valley Electric Corporation (OVEC) for the Portsmouth GDP and from Electric Energy Incorporated (EEInc.) for the Paducah GDP. In addition, FY 1990 will mark the first time that the Uranium Enrichment program will have to satisfy production requirements by relying on large amounts of nonfirm power from utilities other than OVEC and EEInc. These purchases of nonfirm power will continue in FY 1991 and beyond. FY 1991 power purchases have been reduced by utilizing inventories of natural uranium to "overfeed" the GDPs. The amount included in the FY 1991 budget for power purchases totals $831,200,000 and will permit the production of about 12.4 million SWU to meet expected delivery requirements.

In FY 1991, the Uranium Enrichment program will pay the Tennessee Valley Authority (TVA) a total of $160,000,000 for excess contract demand, which is consistent with the December 1987 agreement between the Department and TVA that settled the contract dispute between the two parties. In FY 1991, the program will continue purchasing all of the power under contract with OVEC and EEInc., and will make no payments for unused demand to either electric supplier. The last payment to these suppliers for unused demand was made in FY 1989.

The Uranium Enrichment program and its operating contractor will continue to operate the GDPs in a safe, environmentally sound and cost-effective manner while fulfilling the energy and security needs of the Nation. Efforts will continue to improve the overall quality of operations and maintenance to levels of quality commensurate with the worldwide standard of excellence for commercial uranium fuel cycle facilities. In addition, operations will be identified and supported to continue to make the enterprise cost efficient. The operation of the GDPs will be staffed to ensure customers' orders are met on time, safely, and with appropriate analytical support to ensure the product quality and adherence to specifications that is necessary to meet customer needs. The maintenance and training activities necessary to the continuing high reliability of equipment performance will be fully supported. A consolidated technical support program to improve process systems and equipment will continue, including the activities necessary to transfer and utilize more efficient process equipment from the shutdown Oak Ridge GDP to the two operating plants. A range of supporting services will be provided to the operating sites, including interplant shipments, storage of depleted uranium, engineering studies to support capital improvements, and production planning. A full range of marketing activities will continue to be supported to ensure the enterprise is highly responsive to customer needs and to meet market share objectives. Finally, capital equipment and construction projects will continue to be funded in order to keep the GDPs operating efficiently and in an environmentally sound manner. The amount included in the FY 1991 budget for these non-power activities totals $364,400,000.

I. Preface: Gaseous Diffusion Operations and Support - (Cont'd)

Production and delivery requirements are based on the best available information from commercial and Government customers.

II. A. Summary Table

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request	% Change
Diffusion Cascade Power	$ 838,960 1/	$ 891,500	$ 791,200	-11
Diffusion Operations	94,291	188,039	213,300	+13
Recovery of Diffusion Scrap	4,549	5,201	5,500	+6
Process and Long-Range Technical Support	15,227	15,583	18,100	+16
Supporting Services - UEA	21,004	30,953	34,500	0
Supporting Services - Non-UEA	5,558	6,139	6,000	0
Change in Inventories	-405	-1,572	-400	+75
Cost of UEA Services	8,810	9,600	9,500	-1
Capital Equipment	12,187	8,015	15,700	+96
Construction	40,296	41,908	62,200	+48
Total, Gaseous Diffusion Operations and Support	$ 1,040,486	$ 1,195,464	$ 1,155,600	-3

II. B. Major Laboratory and Facility Funding

Lawrence Livermore National Laboratory, California	464	455	455	0
Martin Marietta Energy Systems, Paducah, Kentucky	230,517	339,318	418,980	+23
Martin Marietta Energy Systems, Portsmouth, Ohio	320,552	435,383	519,235	+19
Martin Marietta Energy Systems (ORGDP), Oak Ridge, Tennessee	18,783	17,988	18,100	0
Oak Ridge Operations Office, Oak Ridge, Tennessee	468,679	394,188	182,290	-54
All Other	1,491	8,132	16,540	+103

1/ Excludes an additional $20,000,000 provided via an appropriation transfer from the Departmental Administration appropriation account and includes an additional $55,000,000 provided via a Supplemental appropriation for power purcheses.

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III. Activity Description

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
Diffusion Cascade Power			
Capacity Charges	The capacity charges for power not purchased, includes: $465,000,000 for TVA; $3,800,000 for EEInc., and $6,800,000 for OVEC. ($475,680)	The capacity charges for power not purchased included in the budget estimate is $311,753,000 for payment to TVA. ($311,753)	The estimate of capacity charges for power not purchased included in the budget estimate is $160,000,000 for payment to TVA. ($160,000)
Purchased Power	Purchase power sufficient to operate a two-plant complex at 2,250 megawatt-years. Production was 8.6 million SWU. ($362,569)	Purchase power sufficient to operate a two-plant complex at 3,022 megawatt-years. Estimated production will be 11.3 million SWU. Large scale purchase of nonfirm power will be initiated. ($579,835)	Purchase power sufficient to operate a two-plant complex at 3,334 megawatt-years. Estimated production will be 12.4 million SWU. Large scale purchase of nonfirm power will be continued. ($631,200)
Tax Liability	DOE's additional tax liability associated with the IRS audit of OVEC was $800,000. ($800)	EEInc. has successfully concluded the appeal of the IRS audit with the result that DOE has no tax liability. ($0)	DOE's potential tax liability associated with a second IRS audit of EEInc. is estimated to be $13,000,000. Because of the similarity to the OVEC audit, we expect EEInc. to successfully appeal the audit findings. ($0)
Subtotal, Diffusion Cascade Power	($838,969)	($891,588)	($791,200)
Diffusion Operations	Diffusion operations activities included plant operations, associated safeguards and security, maintenance services, e.g., analytical analysis, production support including uranium control and decontamination, plant engineering support, and utilities, e.g. water and nitrogen.	Same activities as FY 1989 level. All operating accounts reflect increases from FY 1989 levels associated with escalation, together with additional manpower and materials required to maintain the continued safe and efficient operation of the plants to maintain higher power operation. An	Same activities as FY 1990 level. All operating accounts reflect increases from FY 1990 levels associated with escalation and fringe benefit costs, together with additional manpower required for the higher power operation.

III. Gaseous Diffusion Operations and Support (Cont'd)

Program Activity	FY 1985	FY 1986	FY 1987
Diffusion Operations (continued)	Conducted efforts related to plant operations, i.e., payment of wages, employee benefits, supplies and expenses; the cost of maintenance of equipment, buildings, and facilities used in the production of enriched UF_6; the costs to perform technical and production services such as plant engineering, laboratory studies, decontamination, handling of source and special materials and uranium control; utility services, including water, nitrogen, steam, and dry air; and a pro rata share of essential plant services such as, janitorial, grounds maintenance, and general and administrative expenses. Transfer of process equipment from ORGDP to the Paducah and Portsmouth plants was initiated. ($94,791)	expense project such as roof repair will continue. The transfer of process equipment from ORGDP to Paducah and Portsmouth will continue. ($188,039)	Provides for updating safety analysis and operational safety reports, enhancing training programs through additional accreditation, increasing operational safety and contamination control, cleaning up and removing hazardous materials, increasing the operational and maintenance manpower and materials that were deferred from previous years, increasing manpower required for laboratory, technical and administrative support, and upgrading computer software. Expense projects to repair the roads on the sites and the water tower at Portsmouth are also included. The transfer of process equipment from ORGDP to Paducah and Portsmouth will continue. ($213,300)
Recovery of Diffusion Scrap	Conducted efforts related to the recovery of uranium from solutions generated as a result of decontamination activities at the two operating GDPs. ($4,549)	Same activities as FY 1985 level. ($5,201)	Same activities as FY 1986 level. ($5,500)

III. Gaseous Diffusion Operations and Support (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Process and Long-Range Technical Support	Conducted a consolidated technical program to improve process systems or equipment to meet production needs and to reduce SWU costs including the support and evaluation of the use of ORGDP process equipment at the two operating sites; assured that technology is available for the diffusion plants to meet environmental, health and safety requirements; and responded to day-to-day operating problems that could affect continued operability. ($15,227)	Same activities as FY 1989 level. Support will continue for the transfer of ORGDP equipment to Paducah and Portsmouth. ($15,503)	Same activities as FY 1990 level. Increased support will be provided for the transfer of ORGDP equipment to the two operating sites. ($18,100)
Supporting Services - UEA	Maintained currently unused portions of the gaseous diffusion plants and associated facilities in standby at Portsmouth and Paducah for future use; maintained food facilities at Paducah in standby; maintained selected sections of the ORGDP cascade equipment for transfer to Paducah and Portsmouth; provided for interplant product flow and other shipments among the gaseous diffusion sites, including the guarding of classified material in transit; provided for warehousing of uranium in various forms at the gaseous diffusion sites; provided for special management studies, including conceptual design work for line-item construction and GPPs planned for future years; provided for engineering and planning studies to support capital improvements and to improve operating efficiency; provided for marketing activities, business	Same activities as FY 1989 level, except does not include the benefits of selling surplus material. Includes the preparation of an increased number of engineering and design reports to support the continued operation of the plants and to assure compliance with environmental regulations. ($30,953)	Same activities as FY 1990 level, except provides additional funding for Headquarters business services. ($34,500)

III. Gaseous Diffusion Operations and Support (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Supporting Services - UEA (continued)	services, and various production optimization and demand studies, and special study requests. ($21,004)		
Supporting Services - Non-UEA	Conducted major repairs and maintenance of warehousing facilities. Maintained nondiffusion related facilities. Provide funding for generic energy studies, etc. ($5,558)	Same activities as FY 1989 level, except for the cost of packaging uranium compounds for off-site shipments. ($6,139)	Same activities as FY 1990 level. ($6,000)
Change in Inventories	Conducted efforts to reduce the size of the Oak Ridge GDP common-use stores and special process spares inventories in light of it being in a standby condition. (-$405)	Continue efforts to maintain the GDP complex common-use stores and special process spares inventories at minimum levels. (-$1,572)	Same activities as FY 1990 level. (-$400)
Cost of UEA Services	Provided for costs incurred at the Portsmouth plant for withdrawal and analysis of product shipped under commercial toll enriching service contracts, and product shipped to other Federal agencies. These costs are matched by miscellaneous revenues received from the customers for these services. ($8,810)	Same activities as FY 1989 level, except the increased customer requirement for separative work results in additional handling and packaging of UF6 cylinders. ($9,600)	Same activities as FY 1990 level. ($9,500)
Total Gaseous Diffusion Operations and Support - Operating Expenses	($988,003)	($1,145,541)	($1,077,700)

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III. Gaseous Diffusion Operations and Support (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Gaseous Diffusion Operations and Support - Capital Equipment	Provides for the replacement of equipment at the GDPs that has exceeded its useful life and to purchase additional equipment needed to meet program objectives.	Provides for the replacement of equipment at the GDPs that has exceeded its useful life and to purchase additional equipment needed to meet program objectives.	Provides for the replacement of equipment at the GDPs that has exceeded its useful life and to purchase additional equipment needed to meet program objectives. The FY 1991 request also includes three new major items of equipment, including a computer upgrade, $TBD 2/; a X-345 transformers (Portsmouth, Ohio), $1,000,000; and a Normatex pump (Paducah, Kentucky), $1,000,000.
	($12,187) 1/	($8,015)	($15,700)
Gaseous Diffusion Operations and Support - Construction	Project 88-N-502, Process Inventory Control System, Paducah, Kentucky (TEC $59,300,000) Provides for the process equipment and systems to enable the Paducah GDP to utilize less expensive, nonfirm electrical power which can reduce production costs. Modifications to the existing 161 KV systems at Paducah will also be required, as well as modifications to selected utilities and systems associated with the new 345/161 KV transmission system being installed under terms of the DOE/EEInc. power contract. ($28,000) 3/	Project 90-N-501, Cooling Tower Modifications, Portsmouth, Ohio (TEC $17,096,000) Provides for the upgrading of six existing cooling towers at the Portsmouth GDP. Project is needed to restore the towers to their original design thermal capacity and structural integrity to ensure operations at high power levels. ($296)	Project 91-U-200, Replacement of Capacitors, Paducah, Kentucky (TEC $8,400,000) Provides for the replacement of all 11,000 process and switchyard capacitors needed for full power operations. ($4,000)

1/ Excludes additional obligations provided via a reprogramming from other Uranium Supply and Enrichment Activities appropriation accounts.
2/ There is currently an in-depth Departmental study being conducted of the information resource requirements for the Uranium Enrichment Program addressing Portsmouth, Ohio; Paducah, Kentucky; Oak Ridge, Tennessee and Headquarters needs. At the conclusion of this study in FY 1990, major computer item(s) may be required in FY 1991.

3/ Includes obligations totaling $20,000,000 that were transferred via a reprogramming to Gaseous Diffusion Operations and Support operating expenses.

III. Gaseous Diffusion Operations and Support (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Gaseous Diffusion Operations and Support - Construction (continued)	Project 89-A-501, UF6 Cylinders and Storage Yards, Paducah, Kentucky and Portsmouth, Ohio (TEC $31,123,000) Provides for cylinders and storage yards for process tails needed to continue operations. ($5,800) Project 89-A-502, General Plant Projects, various locations (TEC $6,496,000) Provides for various items of new construction, additions, and alterations to the land, buildings and utility systems at the three GDPs. 1/ ($6,496)	Project 90-A-502, General Plant Projects, various locations (TEC $3,612,000) Provides for various items of new construction, additions, and alterations to the land, buildings and utility systems at the GDPs. ($3,612) Project 89-A-501, UF6 Cylinders and Storage Yards, Paducah, Kentucky and Portsmouth, Ohio (TEC $31,123,000) Provides for cylinders and storage yards needed to continue operations. ($5,823) Project 88-A-502, Process Inventory Control System, Paducah, Kentucky (TEC $59,300,000) Provides funding to continue the project. ($24,676)	Project 91-U-201, Refurbish Interim Purge Facility, Portsmouth, Ohio (TEC $5,200,000) Provides for additional cold trapping facilities needed to improve maintenance capabilities at full power operations and to dispose of light gases. These new capabilities will be provided by refurbishing the previously unused Interim Purge Facility. ($1,400) Project 91-U-207, Roof Upgrading, Portsmouth, Ohio (TEC $21,800,000) Provides for the upgrading and replacement of 35 year old process building and other building roofs. ($3,800) Project 91-U-208, Safeguards and Security Upgrading, Portsmouth, Ohio (TEC $14,000,000) Provides safeguards and security upgrades needed to meet DOE requirements for physical security and materials accountability. ($3,500)

1/ Excludes additional obligations of $5,000,000 provided via a reprogramming from other Uranium Supply and Enrichment Activities appropriation accounts.

III. Gaseous Diffusion Operations and Support (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Gaseous Diffusion Operations and Support - Construction (continued)	Project 82-R-413, Improved UF6 Containment, gaseous diffusion plants (TEC $35,000,000) Provides for installation of additional autoclave capacity at the X-344A Toll Transfer Facility at Portsmouth. This additional capacity is needed to meet customer demands which are expected to increase significantly over the next 5 years. ($0) 1/	Project 82-R-413, Improved UF6 Containment, gaseous diffusion plants (TEC $35,000,000) Provides for installation of additional autoclave capacity at the X-344A Toll Transfer Facility at Portsmouth. This additional capacity is needed to meet customer demands which are expected to increase significantly over the next 5 years. ($7,501)	Project 91-U-209, Process Inventory Control System, Phase II, Portsmouth, Ohio (TEC $14,300,000) Provides for the process equipment and systems to enable Portsmouth GDP to utilize less expensive nonfirm electrical power which can reduce production costs. ($3,800) Project GPN-501, General Plant Projects, various locations (TEC $12,600,000) Provides for various items of new construction, additions, and alterations to the land, buildings, and utility systems at the GDPs. ($12,600) Project 90-N-501, Cooling Tower Modifications, Portsmouth, Ohio (TEC $17,096,000) Provides for the upgrading of six existing cooling towers at the Portsmouth GDP. Project is needed to restore the towers to their original design thermal capacity and structural integrity to ensure operations at high power levels. ($8,700) Project 89-N-501, UF6 Cylinders and Storage Yards, Paducah, Kentucky and Portsmouth, Ohio (TEC $31,123,000) Provides for UF6 cylinders and storage yards needed to continue operations. ($10,100)

1/ Excludes $1,400,000 provided via a reprogramming from other Uranium Supply and Enrichment Activities appropriation accounts.

III. Gaseous Diffusion Operations and Support (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Gaseous Diffusion Operations and Support - Construction (continued)			Project 88-N-502, Process Inventory Control System, Paducah, Kentucky (TEC $50,300,000) Provides funding to continue the project. ($8,300) Project 87-N-502, Cooling Tower Upgrading, Paducah, Kentucky (TEC $8,300,000) Provides for the upgrading of three existing cooling towers at Paducah GDP. Project will restore towers to original cooling capacity needed for high power operations. ($2,000) Project 82-R-413, Improved UF6 Containment, gaseous diffusion plants (TEC $35,000,000) Provides for the installation of additional autoclave capcity needed to meet customer orders in the 1990s. ($4,000)
Total Gaseous Diffusion Operations and Support - Construction	($40,296)	($41,908)	($62,200)
Total Gaseous Diffusion Operations and Support	($1,040,486)	($1,195,464)	($1,155,600)

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

URANIUM ENRICHMENT ACTIVITIES

I. Preface: Atomic Vapor Laser Isotope Separation

In achieving the National goal of Scientific and Technological Competitiveness, the principal objective of the Atomic Vapor Laser Isotope Separation (AVLIS) program is to develop an advanced technology option that can enrich uranium at a cost significantly less than the production costs for gaseous diffusion plants (GDPs) and of foreign competitors. The near-term objective of the research and development program is to reduce the technical uncertainties of the AVLIS technology to acceptable levels in order to allow for a decision on commercialization of the process. The Department has committed to complete a demonstration in FY 1992 in order to ensure that transition to a commercial plant can be made on both a timely and successful basis. Based on the results of the demonstration, the accompanying off-line testing and the various technical and economic assessments, a body of knowledge will be available that can support a prudent deployment decision.

In relation to the Department's planning horizon, AVLIS supports near-term (within 5 years), mid-term (1995 through 2005) and long-term (beyond 2005) goals. The current enrichment contracts extend through FY 1999 and and sales opportunities of about $2.6 billion per year are available in FY 2000 and beyond. Many utilities are expected to make decisions in the early 1990s for their post-1999 needs. Therefore, successful completion of the AVLIS demonstration in the early 1990s is expected to be a major factor in near term marketing efforts. In the mid to long term, AVLIS has the potential for cost savings of $200,000,000 to $600,000,000 per year by replacing the existing GDPs; affords protection against cost increases to the GDPs for environmental or other reasons; has significant marketing potential to capture about $300,000,000 per year in additional sales in the mid-to-late 1990s; offers the potential to compete for the market for reprocessed uranium of $200,000,000 per year; and has an attractive investment potential after R&D is completed enhancing privatization interests in enrichment.

The demonstration in FY 1992 will utilize a full scale Uranium Demonstration System (UDS) located in the Separator Demonstration Facility (SDF) and optical power from the Laser Demonstration Facility (LDF). The demonstration will be designed to measurably reduce risks for plant deployment and narrow the bounds on technical performance, operability, and economics at full scale. The development activities will be structured so as to establish confidence in AVLIS enrichment performance and in capital and operating cost projections based on demonstrated experience.

During the FY 1990-91 time period, activities will be focused in two major areas: (1) Preparation for and completion of the demonstration in FY 1992 and (2) Preparation of the technical and economic data packages that are necessary in order to best evaluate whether an AVLIS production plant can or should be deployed. The information provided from these activities will be used by the Department to make a decision in FY 1992 regarding the construction of an AVLIS production facility. Highlights of these activities include the following:

Lasers

- Increase power and improve reliability of existing lasers in the LDF.
- Develop and test a more powerful advanced copper laser (CL).
- Build and install several chains of advanced CLs.
- Upgrade optics and laser delivery systems.

Separators

- Build and conduct tests in a prototype of the UDS separator.
- Design and construct the UDS separator.
- Continue the search for lower cost, longer lasting separator materials.

I. Preface Atomic Vapor Laser Isotope Separation - (Cont'd)

Uranium Processing

- o Select the uranium feed process and begin design of a test facility.
- o Complete the uranium product facility and begin making material for testing.

Process Development

- o Design, carry out, and evaluate the integrated process demonstration.
- o Publish a series of data packages of demonstration results.

Pre-Deployment Planning

- o Complete conceptual design and update annually based on technical results.

II. A. Summary Table

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request	% Change
Lasers	$ 44,785 1/	$ 57,680	$ 56,800	-1%
Uranium Separators	39,426	39,000	54,100	+39%
Uranium Processing	7,601	8,200	10,600	+29%
Process Development and Pre-Deployment Planning	4,685	4,900	600	-88%
Systems Integration	19,496	21,000	21,900	+5%
Technology Transfer and Analysis	1,125	2,500	2,500	0%
Capital Equipment	5,000	7,995	5,600	-30%
Construction	3,400	987	2,400	+143%
Total, Atomic Vapor Laser Isotope Separation	$ 125,518	$ 132,262	$ 154,500	+17%

II. B. Major Laboratory and Facility Funding

Lawrence Livermore National Laboratory, California	105,068	109,475	133,600	+22%
Martin Marietta Energy Systems (ORGDP), Oak Ridge, Tennessee	19,650	20,287	18,400	-9%
All Other	800	2,500	2,500	0%

1/ Excludes $1,482,500 for the Small Business Innovative Research transfer.

III. Activity Description:

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
Lasers	The activity in lasers involves the design, procurement, assembly, operation, test, and evaluation of all laser components. This includes the copper lasers, dye lasers, optical transport systems, assembly and refurbishment facilities, and auxiliary systems such as dye pumping, cooling water, electrical, and mechanical systems. In FY 1989, there was a major change in strategy for laser development. The previous plan had been to build, install, and operate in the LDF a system powered by four corridors of CLs, with each corridor containing six laser chains. This was to be followed by development and installation into LDF of an advanced, more powerful CL in the early 1990's. In order to reduce costs and save time, a decision was made to install only two corridors of the existing CL and immediately begin development of the advanced CL. In the current plan, work will continue to maximize the performance of the existing two corridors of lasers while putting major emphasis on development of the advanced CL. The objective is to have the existing two corridors of CLs plus several chains of advanced lasers provide the laser power for the enrichment demonstration in FY 1992. Concurrent activity will include the upgrade and expansion of the dye laser, optical transport and other laser systems necessary to provide the laser light to the separator chamber. During FY 1989, the majority of the effort was to design the advanced laser and optical systems and to develop equipment, prototypes and technical approaches as required. During FY 1990, the majority of the procurement,	In FY 1990, the lasers in LDF will continue to be operated 24 hours per day, 7 days per week. This will continue to provide the opportunity to improve performance, increase reliability, and reduce costs for laser components and subsystems. The SIS program will complete its tests using the laser light by the end of FY 1990. Minor modifications to the system will be made to make the light available to this program in time for the FY 1992 demonstrations. By the end of FY 1990, the continuing incremental improvements in corridors 1 and 2 should reach the goals for output power for the FY 1992 demonstration. This will include minor modifications to equipment and support systems, operations, and refurbishment procedures. In advanced lasers, the first prototype chain will be operational. Engineering and production design will be carried out in parallel with the prototype development. The dye laser system in LDF will be upgraded to support the FY 1992 demonstration. Additional dye laser amplifiers will be added as appropriate to the existing dye laser chains to accommodate the increased copper laser power available from the copper laser chains. The optical systems required to format, align, and control the dye laser and auxiliary laser beams from LDF to the uranium separator will be completed. Laser refurbishment facilities will be upgraded to handle the advanced CL as appropriate. A key activity will be the completion of the module optics system to transport the laser light inside the	In FY 1991, the major emphasis will be on activating the laser systems which have been brought on line and providing increasing amounts of laser light for the integrated enrichment experiments which will be carried during the later part of the year. The first chain of advanced CLs will be assembled and installed in corridor 3 of the LDF. This chain will be used to verify utility interfaces and support systems, to examine the chain performance characteristics in an operating environment, to begin accumulating operating hours to identify reliability and refurbishment leverage areas, and to provide light for copper laser light transport system testing. Subsequently, additional chains will be installed and activation and integration with the existing lasers systems will begin. As activation proceeds, increasing amounts of copper laser light will be delivered for use in the enrichment experiments. In dye laser and optical systems, the emphasis will be on integrating and delivering increasing amounts of process laser light to the separator chamber. The system will be operated under full power conditions with all wavelengths and with laser beams of the appropriate spatial and temporal formats. Design and operational procedure modifications resulting from the operational experience of the integrated demonstrations will be incorporated as appropriate. The first laser light will be introduced into the separator module optics system by passing light through the separator units and all associated beam control and diagnostic systems.

III. Atomic Vapor-Laser Isotope Separation (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Lasers (continued)	construction and installation efforts will be accomplished. During FY 1991, the various laser systems will be activated and operated to achieve technical goals. In FY 1989, the lasers in LDF will continue to be operated 24 hours per day, 7 days per week. This provides the opportunity to improve performance, increase reliability and reduce costs for laser components and subsystems. Laser light will be used to power various tests for the SIS program. In advanced development, components of an advanced CL were designed and tested. At the end of the year, work began to integrate the various components. In dye lasers and optical systems, design of the optical transport system for the advanced CL and design of modifications to the dye laser corridors to handle the advanced CL was begun. Also, design of the laser optical system which will transport the laser light inside the separator chamber was started. ($44,785)	separator chamber. The functioning of the line-of-sight system and the start of module optics testing will occur in the fourth quarter of FY 1990. ($47,680)	This is a prerequisite for the laser/separator system integration activities in FY 1991. ($56,800)
Uranium Separators	Separator development includes all activities to design, construct, operate, and test uranium separator systems which are the devices in which uranium enrichment takes place. Inside of a vacuum chamber, uranium metal is vaporized, selectively ionized by the laser light, and then separated into product and tails streams by an electrically charged extractor device. This equipment is supplemented by high voltage power, a vacuum system, feed and withdrawal systems, cooling water, computer operated instrumentation and controls, and extensive facilities to refurbish	Separator development in FY 1990 will be marked by two major activities: the startup and operation of the prototype UDS separator and the concurrent procurement, installation and startup of the multi-unit UDS separator to be used in the FY 1992 demonstration. The prototype separator will be placed in full operating status in FY 1990 including the extractor device which vaporizes the uranium and extracts the preferred isotope. It will also include a feed and withdrawal system, instrumentation and controls and other components so that test operations of the integrated	At the beginning of FY 1991, integration of the UDS separator and laser systems will begin, with the introduction of first laser light for module optics testing. The remaining facility modifications and equipment installations to support uranium vaporization testing will be completed by mid-year. The uranium vaporization testing will be completed and the first integrated laser/separator photoionization runs will begin late in the year. After a number of operating hours, vaporizers and extractors must be

Program Activity	FY 1989	FY 1990	FY 1991
Uranium Separators (continued)	vaporizers and extractors after a number of operating hours. Separator development is characterized by the three major test facilities, of which two, the Mars and SDF, are already in operation with the third, the UDS separator, remaining to be built. The objectives of the uranium separator activities are to develop a multi-unit separator module and demonstrate its operation in a normal operating environment to validate separator performance and capital and operating costs. The development program is geared toward providing the technology and facilities required for the FY 1992 demonstration. In FY 1989, the programmatic emphasis was on the design and procurement of the prototype separator module. In FY 1990, the prototype will become operational and provide the basis for design, procurement and construction of the UDS separator. By FY 1991, laser light will be introduced into the separator chamber and the process of laser/separator integration will begin. Concurrent activities will proceed to develop low cost, long-lived separator materials which can withstand the interaction with liquid uranium; development of separator auxiliaries such as feed and withdrawal systems and instrumentation and controls; construction of special facilities such as separator refurbishment and materials handling; and integration of components into a separator system. The principal activity in FY 1989 was the design and procurement of the prototype UDS separator. Other efforts were directed toward testing of alternative materials to be used	system can be initiated. The primary purpose will be to test and evaluate in a prototype environment, vaporizer and extractor components and alternative extractor materials without laser light. It will subsequently be utilized for off-line testing and continuing engineering of separator systems. Initial installation of the multi-unit UDS separator module will occur during FY 1990, as will installation of module utility systems and module optics. The utility systems will include feed and withdrawal systems, a vacuum system, power supplies, cooling water and other systems. The module optics will include the optical components which will pass the laser light back and forth within the separator chamber. It is planned to have this separator operational to support the first vapor/laser light integration early in FY 1991. ($39,000)	refurbished. Old units must be repaired or replaced; new units assembled and tested; and scrap and waste must be prepared for disposal or recycle. Refurbishment facilities will be upgraded to support the expanded activities planned in FY 1991 and FY 1992. ($54,100)

III. Atomic Vapor Laser Isotope Separation (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Uranium Separators (continued)	inside the separator in the high temperature, corrosive atmosphere of liquid uranium. This is done through long-run testing in the existing Mars facility and other offsite facilities. Other major activities during FY 1989 included development and testing of the electron beam gun and overall vaporizer system which converts uranium metal into uranium vapor which can be enriched. A vapor properties data package was issued. ($39,426)		
Uranium Processing	This activity is concerned with all research, development, and demonstration of processes to integrate AVLIS into the commercial nuclear fuel industry. The existing industry is based on the use of uranium hexafluoride gas as input and output of the gaseous diffusion plants, whereas the AVLIS process uses uranium metal. Adaptation of processes which avoid the use of uranium hexafluoride (UF_6) has the potential of saving 15 to 20 percent of the cost of a separative work unit as compared to the use of UF_6 based processes. Development is broken into two major branches; feed conversion which involves the conversion of natural uranium ore into uranium metal as feedstock to the AVLIS process and product conversion which converts the uranium metal product from AVLIS into a form which can subsequently be made into fuel for use in nuclear power reactors. The successful implementation of AVLIS enrichment requires the integration into the established private sector uranium processing industry. Plans for the next 3 years are to continue	Continued bench-scale experiments, technical assessments, conceptual designs, and cost studies will lead to the selection of the preferred feed preparation process by mid-year. This will be followed by the design of a prototype facility to convert uranium ore to uranium metal. Product conversion efforts will be directed toward the design and construction of a prototype product facility. Design will be completed by mid-year and construction will begin. In addition, uranium oxide produced in FY 1989 will be characterized in-house, and limited studies of kiln performance will be completed using a pilot scale kiln. The second phase of the RFP with the reactor fuel fabricators will be carried out. The nature of the activities will be determined by the results of the cooperative efforts in FY 1989. ($8,200)	The modifications to prepare a building at the Oak Ridge site for the installation of the feed and product conversion demonstration facilities will be completed. Installation of a monitored uranium stack and exhaust system, modification to the building utilities, and building renovations will be required. In feed conversion, design of the prototype facility will be completed and equipment procurement, fabrication, and installation will proceed. The prototype product conversion facility will be operated to obtain operating and performance data and to produce uranium oxide material for purity and morphology testing. The purity determinations will provide data for a decision on the need for further purification steps in the process. Uranium metal producers, feed converters and fuel fabricators will be actively involved in the integration of AVLIS technology into the nuclear fuel cycle. Information meetings will be held on the status

III. Atomic Vapor Laser Isotope Separation (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Uranium Processing (continued)	discussions with potential industrial participants and to establish joint development and demonstration contracts to encourage the cooperation of private industry in the cost effective implementation of AVLIS uranium processing. In feed conversion, economic analysis suggested that a process called electrolytic reduction, similar to that used in the aluminum industry, offers the best potential to economically convert uranium ore to AVLIS feedstock. Bench-scale experiments of electrolytic reduction in FY 1989 using a fluoride based bath failed to achieve expected efficiencies. Efforts to investigate the feasibility of metal production using a chloride based bath were initiated in parallel. Bench-scale experiments in both processes will continue throughout the year. In product conversion, conceptual designs will be completed for the remaining portions of the conversion cycle. The bench-scale data and conceptual designs will be used to modify the product processing cost estimates as necessary. Design of a prototype metal conversion facility sufficient to begin long lead equipment procurement will be completed. A request for proposal (RFP) has been issued to establish an AVLIS interface with nuclear power reactor fuel fabricators. The purpose is to establish cooperative working arrangements, a technical basis for proceeding and a strategy and plan leading to		of the AVLIS program and to develop plans for interfacing. A decision will be made on the need for in-reactor testing of AVLIS product. ($10,600)

III. Atomic Vapor Laser Isotope Separation (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Uranium Processing (continued)	acceptance of AVLIS product as a reactor fuel. ($7,601)		
Process Development and Pre-Deployment Planning	The process development element is concerned with understanding the theoretical physics for the AVLIS process and performing the system integration function. Providing the physics support to the various arms of the program includes computer modeling of the integrated process physics, and participation in the planning, execution, and evaluation of integrated process tests. Special diagnostics to measure process performance in lasers and separators are designed and developed. It is also the focal point for the preparation and periodic update of the process point design which specifies the process performance requirements necessary to optimize plant economics. The planning element includes the strategic and operational long range planning activities necessary to provide the basis for application of the uranium AVLIS technology. In addition, it includes those predeployment planning activities such as environmental assessments, safety analysis, and licensing applications which must begin prior to a decision to start construction of an AVLIS production plant. During FY 1989, the process development activity will continue to refine process spectroscopy data, explore alternative and more efficient photoionization pathways, and play a major role in the definition of the baseline design and the performance	The numeric point design will be evaluated to include photoionization pathways and temporal and spatial laser formats that could improve performance. These results will be used to update the configuration of the FY 1992 enrichment demonstrations. The point design, the engineering/technology assessment and the economic assessment will be updated. More detailed plans to address licensing and environmental compliance will be prepared. Work will begin to assess compliance with all Federal, state, and local regulations as well as DOE internal standards for environmental, safety, safeguards, quality assurance, licensability, and other plant requirements. ($4,900)	The major focus in process development will be on supporting the integrated enrichment demonstrations. Planning for the tests will be provided. Special process diagnostics will be developed and integrated to monitor enrichment performance. Data will be analyzed and compared to process model predictions. These results will be used to validate projected plant performance. During FY 1991, the CDR will be issued. It will contain a complete design description of an AVLIS plant, capital and operating cost estimates, and plant schedules. It will serve as the design basis for proceeding with a production plant. ($600)

III. Atomic Vapor Laser Isotope Separation (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Process Development and Pre-Deployment Planning (continued)	goals for the FY 1992 demonstration. The analysis groups will perform trade-off studies of key process design options versus cost scaling, which will serve as the basis for the FY 1989 point design update. A new point design, engineering/technology assessments, and economic assessments were completed. In planning, preconceptual engineering and cost estimating will begin based on the FY 1988 point design. Moreover, the conceptual design report (CDR) for the AVLIS production plant was started. Preliminary planning will begin for assuring compliance with environmental, safety, and licensing regulations. ($4,685)		
Systems Integration	This element consists of those overall support activities required for the execution of the line elements of the program. This includes project management and planning functions such as management staff, senior scientific staff, and budget and planning; program operations functions such as environmental protection, safety, safeguards and security, quality assurance, configuration management and technical information services; communications and control systems not directly a part of other line items such as software maintenance and development, training and computer-aided design support; and facilities operations and maintenance not directly a part of other line items such as maintenance and operations of vehicles, office furniture, office machines, trailers, and utilities. ($19,496)	Same activities as described in FY 1989. ($21,000)	Same activities as described in FY 1989. ($21,900)

III. Atomic Vapor Laser Isotope Separation (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Technology Transfer and Analysis	Continue independent assessment and analysis of the AVLIS technology using a panel of experts, the Technology and Engineering Review Group and other sources. Update independent economic models of the AVLIS process based on test results. Update strategic economic evaluation of AVLIS in relation to the Enrichment Enterprise. ($1,125)	Continue independent technical, economic, and strategic assessments as in FY 1989. A Senior Industrial Review Group will be established to provide an independent assessment of the AVLIS plan from a business and market perspective. This group will provide advice regarding the merits of planned demonstration activities, the relevancy of those activities in answering questions needed to be able to make a deployment decision, and the confidence of cost estimates based on demonstration data that will be generated. Develop criteria and evaluate alternative sites for an AVLIS production plant. ($2,500)	Continue independent technical, economic, and strategic assessments as in FY 1990. ($2,500)
Total, Atomic Vapor Laser Isotope Separation - Operating Expenses	($117,118)	($123,280)	($146,500)
Atomic Vapor Laser Isotope Separation - Capital Equipment	Capital equipment will be purchased to support laser development, separator development, and other activities. Principal types of purchases will include: power supplies and copper laser electronic components, instrumentation and control systems, components and data processing equipment, test equipment such as special diagnostic scopes, analyzers, probes, and diagnostic measurement tools. ($5,000)	Continue similar type of capital equipment purchases described for FY 1989. ($7,995)	Continue similar type of capital equipment purchases described for FY 1990. ($5,600)

III. Atomic Vapor Laser Isotope Separation (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Atomic Vapor Laser Isotope Separation - Construction	Project 89-N-503, General Plant Projects, various locations (TEC $3,400,000). This project will provide for capital improvements, alterations, modifications, and upgrading of various facilities. ($3,400)	Project 90-N-503, General Plant Projects, various locations (TEC $987,000). This project will provide for capital improvements, alterations, modifications and upgrading of various facilities. ($987)	Project GPN-600, General Plant Projects, various locations (TEC $2,400,000). This project will provide for capital improvements, alterations, modifications, and upgrading of various facilities. ($2,400)
Total, Construction	($3,400)	($987)	($2,400)
Total, Atomic Vapor Laser Isotope Separation	($125,518)	($132,262)	($154,500)

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

URANIUM ENRICHMENT ACTIVITIES

I. Preface: Corrective Actions

In accordance with the National goal of maintaining a clean environment, a principal objective of the Uranium Enrichment program is to conduct corrective actions necessary to maintain environmental compliance at its facilities. Corrective Actions are activities or projects needed to bring active facilities, which are currently out-of-compliance with applicable local, State, and Federal regulations and DOE requirements, into compliance in an expeditious manner. Environmental corrective actions include: 1) air corrective actions conducted to reduce or eliminate unacceptable air releases, 2) water corrective actions conducted to reduce or eliminate unacceptable discharges of contaminants to surface waters, and 3) solid waste corrective actions conducted to bring solid waste management operations intc compliance.

The FY 1991 budget is established to address environmental compliance requirements for uranium enrichment facilities located in Portsmouth, Ohio, and Paducah, Kentucky. The budget was established to address environmental compliance requirements identified in the Environmental Restoration and Waste Management Five-Year Plan with priority 1 through 3.

II. A. Summary Table

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request	% Change
Corrective Actions (Active/Standby Sites) Environment				
Air	$ 0	$ 0	$ 0	0
Water	878	422	750	+78
Solid Waste	700	4,700	3,000	-36
Capital Equipment	0	1,330	0	-100
Construction	3,023	1,085	5,500	+407
Total, Corrective Actions	$ 4,601	$ 7,537	$ 9,250	+23

II. B. Major Laboratory and Facility Funding

Martin Marietta Energy Systems, Paducah, Kentucky	2,101	889	2,750	+209
Martin Marietta Energy Systems, Portsmouth, Ohio	400	6,648	6,500	0
Martin Marietta Energy Systems (ORGDP), Oak Ridge, Tennessee	2,100	0	0	0

III. Activity Description:

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
Corrective Actions (Active/Standby Sites) Environment			
Air	No activity. ($0)	No activity. ($0)	No activity. ($0)
Water	Conduct biological monitoring at Paducah. ($878)	Continue biological monitoring at Paducah. Develop feasibility study for a future National Pollutant Discharge Elimination System (NPDES) compliance line item construction project. This project will address new, more stringent NPDES compliance criteria. ($422)	Continue biological monitoring at Paducah. Develop a conceptual design report for the proposed NPDES compliance line item construction project. ($750)
Solid Waste	Prepare a conceptual design report and risk assessment for the FY 1991 PCB line item construction project. This project will place a containment system underneath gaskets which are leaking PCB contaminated oils. The present situation is a noncompliance issue. ($700)	Provides for the replacement of lubrication oil that is contaminated with PCBs. ($4,700)	Same activities as FY 1990. ($3,000)
Total, Corrective Actions (Active/Standby Sites) Environment - Operating Expenses	($1,578)	($5,122)	($3,750)
Corrective Actions (Active/Standby Sites) Environment - Capital Equipment	No activity. ($0)	No activity. ($1,330)	No activity. ($0)

III. Corrective Actions (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Corrective Actions (Active/Standby Sites) Environment - Construction	Project 89-N-502, General Plant Projects, various locations (TEC $3,023,000) Provides for various new construction additions and alterations to the land and buildings to make required environmental corrective actions at Paducah, Kentucky and Oak Ridge, Tennessee. ($3,023)	Project 90-N-502, General Plant Projects, various locations (TEC $1,085,000) Provides for various new construction additions and alterations to the land and buildings to make required environmental corrective actions at Paducah, Kentucky and Portsmouth, Ohio. ($1,085)	Project 91-U-206, Reduction of PCB Contamination, Paducah, Kentucky and Portsmouth, Ohio (TEC $67,000,000) Provides for the installation of about 100,000 collection troughs beneath the PCB-contaminated gaskets in the process exhaust ventilation ducts at both operating GDPs. This is required to correct environmental noncompliance. ($5,500)
Total Corrective Actions (Active/ Standby Sites) Environment - Construction	($3,023)	($1,085)	($5,500)
Total, Corrective Actions	($4,601)	($7,537)	($9,250)

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

URANIUM ENRICHMENT ACTIVITIES

I. Preface: Environmental Restoration (Inactive Sites)

In accordance with the National goal of maintaining a clean environment, a principal objective of the Uranium Enrichment program is to protect the public and the environment from potential releases of hazardous materials from enrichment facilities and sites due to past operations. These include closed waste sites, decontamination of shutdown facilities including removal of hazardous and radioactive materials which are no longer utilized, shutdown facility surveillance and maintenance, and compliance with cleanup activities required by Resource Conservation and Recovery Act of 1976 (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA).

The FY 1991 budget was established to address environmental compliance requirements for uranium enrichment facilities located in Portsmouth, Ohio, and Paducah, Kentucky, as identified in the Environmental Restoration and Waste Management Five-Year Plan with priority 1 through 3. Also included is a pro-rata share of the environmental compliance requirements for uranium enrichment facilities located in Oak Ridge, Tennessee.

Because the activities to be conducted in this budget are so difficult to predict, the Department is requesting funding for operating expenses, but will also use these funds for capital equipment or general plant projects, as required.

II. A. Summary Table

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request	% Change
CERCLA	$ 5,001	$ 4,974	$ 4,949	0
RCRA	17,546	11,347	10,122	-11
RCRA/CERCLA	9,894	18,343	21,829	+19
Decontamination and Decommissioning (D&D)	13,739	23,762	30,519	+28
Total, Environmental Restoration (Inactive Sites)	$ 46,180	$ 58,426	$ 67,419	+15

II. B. Major Laboratory and Facility Funding

Martin Marietta Energy Systems, Paducah, Kentucky	10,045	20,948	20,485	-2
Martin Marietta Energy Systems, Portsmouth, Ohio	17,273	17,479	11,178	-36
Martin Marietta Energy Systems (ORGDP), Oak Ridge, Tennessee	30,967	16,919	35,756	+111
Oak Ridge Operations Office, Oak Ridge, Tennessee	-12,105	3,080	0	-100

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III Activity Description:

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
CERCLA	Characterization of waste sites at Paducah, Kentucky. ($5,001)	Characterization of rate and extent of offsite contamination at Paducah, Kentucky. Includes sampling of stream sediments, soil sampling of waste sites, and sampling of groundwater. ($4,974)	Continue characterization of off-site contamination. Includes installation of groundwater monitoring wells, continued sampling of stream sediments and soil near waste sites. ($4,949)
RCRA	Begin closure of holding ponds and characterization of waste sites. ($17,546)	Continue closure of holding ponds. Groundwater characterization continues and solid waste management units. ($11,347)	Continue closure of holding ponds. Groundwater and soil sampling continue around solid waste management units. Interim corrective actions will be conducted if contamination migrating from the waste sites is identified. ($10,122)
RCRA/CERCLA	Develop and implement site investigation work plans for waste sites. ($9,894)	Develop and implement investigation work plans. Begin characterization of waste sites. Includes sampling of soil and groundwater near waste sites. ($10,343)	Continue to develop and implement investigation work plans. Continue characterization of waste sites. Interim corrective measures will be conducted if contamination from waste sites is identified. ($21,829)
D&D	D&D funding is required for surveillance and maintenance of gaseous diffusion and gas centrifuge facilities in a standby or shutdown status, and funds for gas centrifuge property disposition and cleanup. ($13,739)	Same activities as FY 1989. ($23,762)	Same activities as FY 1989. ($30,519)
Total, Environmental Restoration (Inactive Sites)	($46,180) 1/	($58,426) 2/	($67,419)

1/ Includes $4,841,000 for project 89-N-502, General Plant Projects.
2/ Includes $1,600,000 for project 90-N-502, General Plant Projects.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

URANIUM ENRICHMENT ACTIVITIES

I. Preface: Waste Management

In accordance with the National goal of maintaining a clean environment, a principal objective of the Uranium Enrichment program is to adequately manage radioactive, hazardous, mixed, and sanitary wastes in a manner which protects the environment, as well as worker health and safety. Waste management includes those activities associated with the minimization, treatment, storage, and disposal of waste streams as a result of gaseous diffusion operations.

The FY 1991 budget was established to address environmental compliance requirements identified in the Environmental Restoration and Waste Management Five-Year Plan with priority 1 through 3.

II. A. Summary Table

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request	% Change
Treatment	$ 5,729	$ 6,518	$ 6,491	0
Storage	2,215	2,574	2,860	+1
Disposal	136	602	953	+58
Capital Equipment	613	525	2,945	+461
Construction	640	3,495	700	-80
Total, Waste Management	$ 9,333	$ 13,714	$ 13,949	+2

II. B. Major Laboratory and Facility Funding

Martin Marietta Energy Systems, Paducah, Kentucky	3,082	5,642	4,679	-17
Martin Marietta Energy Systems, Portsmouth, Ohio	4,372	6,350	7,190	+13
Martin Marietta Energy Systems (ORGDP), Oak Ridge, Tennessee	1,879	1,722	2,080	+21

III. Activity Description:

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
Treatment	Supports day-to-day treatment of waste streams due to operation of the diffusion facilities. Includes operation of all waste treatment facilities. ($5,729)	Supports day-to-day treatment of waste streams due to operation of the diffusion facilities. Includes operation of all waste treatment facilities. ($6,518)	Supports day-to-day treatment of waste streams due to operation of the diffusion facilities. Includes operation of all waste treatment facilities. ($6,491)

III. Waste Management (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Storage	Supports day-to-day storage of waste streams pending final disposal. Includes all costs associated with permitting, maintenance, and monitoring of stored wastes. ($2,215)	Supports day-to-day storage of waste streams pending final disposal. Includes all costs associated with permitting, maintenance, and monitoring of stored wastes. ($2,574)	Increased volumes of waste and costs for waste storage. ($2,860)
Disposal	Supports day-to-day disposal of waste streams due to operations. Includes disposal of hazardous, mixed, and radioactive wastes both onsite and offsite. ($136)	Increased Toxic Substance Control Act (TSCA) incinerator costs. ($602)	Increased TSCA incinerator costs. ($953)
Total, Waste Management - Operating Expenses	($8,060)	($9,694)	($10,304)
Waste Management - Capital Equipment	Provides for various items of equipment for waste management activities. ($613)	Same activities as FY 1989. ($525)	Provides for various items of equipment for waste management activities including one major item of equipment. This item, a waste encapsulator at Portsmouth, Ohio ($2,520,000), will provide a system for volume reduction and encapsulation of various waste streams and incinerator ash. ($2,945)
Waste Management - Construction	Project 89-W-502, General Plant Projects, various locations (TEC $640,000) Provides for various new construction additions, and alterations to the land and buildings to conduct waste management activities at Paducah, Kentucky and Portsmouth, Ohio. ($640)	Project 90-W-502, General Plant Projects, various locations (TEC $3,495,000) Provides for various new construction additions, and alterations to the land and buildings to conduct waste management activities at Paducah, Kentucky and Portsmouth, Ohio. ($3,495)	Project GPN-210, General Plant Projects, various locations (TEC $700,000) Provides for various new construction additions, and alterations to the land and buildings to conduct waste management activities at Paducah, Kentucky and Portsmouth, Ohio. ($700)
Total, Waste Management	($9,333)	($13,714)	($13,949)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

URANIUM ENRICHMENT ACTIVITIES

I. Preface: Program Direction

Provides personnel for continued management support of the Uranium Enrichment program. The number of personnel has not significantly increased in uranium enrichment since the 1960s while the size, competitive pressures, and policy issues have grown many times more complicated since then. The FY 1991 budget request also includes the cost of computer support previously provided by the Office of Computer Services and Telecommunications Management (CSTM) under the Assistant Secretary for Management and Administration. Funding responsibility for this computer support was transferred from CSTM to Nuclear Energy in the FY 1990 budget guidance. The computer support includes training, maintenance, hardware and software acquisitions, modifications, and other telecommunications services for each work station assigned to the Uranium Enrichment program. Continuation of this support is essential to support the effective operation of Nuclear Energy's telecommunication and word processing systems.

II. A. Summary Table

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request	% Change
Salary	$ 2,247	$ 3,361	$ 3,480	+4
Benefits	411	403	480	+19
Contractual Services	810	540	550	+2
Travel	532	730	790	+8
Total, Program Direction	$ 4,000	$ 5,034	$ 5,300	+5

II. B. Major Laboratory and Facility Funding

Not applicable.

III. Activity Description:

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
Program Direction	Provides funding for 62 FTEs at Headquarters for continued management support of the Uranium Enrichment program. In addition to the $4,000,000 appropriated, prior year unobligated funds totaling approximately $722,000 were utilized to provide for salaries, personal benefits, travel and contractual services and supplies. ($4,000)	Provides funding for 67 FTEs at Headquarters for continued management support of the Uranium Enrichment program. This funding provides for salaries, personal benefits, travel and contractual services and supplies. ($5,034)	Provides funding for 67 FTEs at Headquarters for continued management support of the Uranium Enrichment program. This funding provides for salaries, personal benefits, travel and contractual services and supplies. ($5,300)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

URANIUM ENRICHMENT ACTIVITIES

I. Preface: Contributions to Decontamination and Decommissioning Fund

Legislation submitted by the Administration to Congress on April 18, 1989, to create a United States Uranium Enrichment Corporation includes the establishment of an interest bearing Uranium Enrichment Decontamination and Decommissioning Fund in the Treasury. The Corporation would pay $50,000,000 into the Fund in FY 1991 in accordance with various provisions of the legislation.

The Corporation will be responsible for a share of the cost of decontamination and decommissioning (D&D) of property used in low assay enrichment services based on a ratio of low-assay deliveries to commercial and Government customers. The Department will be responsible for the Government's share of D&D costs for property used in low and high assay enrichment services. The amounts contained in the Fund will be used only when the Corporation determines that particular property should be decontaminated or decommissioned, or both.

In the absence of enacted legislation creating a Government Corporation for uranium enrichment, which authorizes an interest bearing Uranium Enrichment Decontamination and Decommissioning Fund in Treasury, the President's budget reflects a D&D fund being created in Treasury in FY 1991 through the appropriations language. The FY 1991 budget reflects a transfer of $50,000,000 of uranium enrichment revenues to the D&D Fund. Funds for D&D have to start accumulating soon in order for there to be a sufficient amount available to D&D surplus uranium enrichment facilities at the end of their expected useful lives. If at a later date legislation passes creating a Government Corporation for uranium enrichment, this Fund will be available to the Corporation for D&D activities.

II. A. Summary Table

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request	% Change
Contributions to Decontamination and Decommissioning Fund	$ 0	$ 0	$ 50,000	NA

II. B. Major Laboratory and Facility Funding

Headquarters, Germantown, Maryland	0	0	50,000	NA

III. Activity Description:

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
Contributions to Decontamination and Decommissioning Fund	No activity. ($0)	No activity. ($0)	A payment of $50,000,000 to the Fund is directed in the proposed Corporation legislation as well as the proposed appropriation language. ($50,000)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

URANIUM ENRICHMENT ACTIVITIES

I. Preface: Payment to Treasury on Debt

Legislation submitted by the Administration to Congress on April 18, 1989, to create a United States Uranium Enrichment Corporation includes a requirement for the Corporation to repay an initial debt of $364,000,000, with interest on the unpaid balance to be paid annually, to the miscellaneous receipts of the Treasury. The Corporation would be required to repay the debt within 10 years.

II. A. Summary Table

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request	% Change
Payment to Treasury on Debt	$ 0	$ 0	$ 29,000	NA
II. B. Major Laboratory and Facility Funding				
Headquarters, Germantown, Maryland	0	0	29,000	NA

III. Activity Description:

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
Payment to Treasury on Debt	No activity. ($0)	No activity. ($0)	A payment of interest of $29,000,000 on the initial debt of Corporation to the Treasury is required by the proposed legislation. ($29,000)

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

URANIUM ENRICHMENT ACTIVITIES

I. Preface: Funds Available for Dividends/Working Capital

Legislation submitted by the Administration to Congress on April 18, 1989, to create a U.S. Uranium Enrichment Corporation, when enacted, would require the Corporation to pay dividends to the Treasury, to the extent that revenues are not needed for program requirements or working capital. Until legislation is enacted, no distribution of these excess funds is proposed.

II. A. Summary Table

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request	% Change
Funds Available for Dividends/Working Capital	$ 0	$ 0	$ 45,482	NA
II. B. Major Laboratory and Facility Funding				
Headquarters, Germantown, Maryland	0	0	45,482	NA

III. Activity Description:

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
Funds Available for Dividends/Working Capital	No activity. ($0)	No activity. ($0)	Amount of revenues that exceed FY 1991 budget authority requirements. ($45,482)

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Uranium Enrichment Activities

IV. A. Construction Project Summary

Project No.	Project Title	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Unappropriated Balance	TEC
82-R-413	Improved UF6 containment, gaseous diffusion plants	$ 23,400 1/	$ 7,501	$ 4,000	$ 99	$ 35,000
87-N-502	Cooling tower upgrading, Paducah, Kentucky, gaseous diffusion plant	6,300	0	2,000	0	8,300
88-N-502	Process inventory control system, Paducah, Kentucky, gaseous diffusion plant	26,000 2/	24,676	8,300	324	59,300
89-N-501	UF6 cylinders and storage yards, Paducah, Kentucky and Portsmouth, Ohio, gaseous diffusion plants	5,800	5,823	10,100	9,400	31,123
90-N-501	Cooling tower modifications, Portsmouth, Ohio, gaseous diffusion plant	0	296	8,700	8,100	17,096
90-N-502	General plant projects, various locations	0	8,192	0	0	8,192
90-N-503	General plant projects, various locations	0	987	0	0	987
91-U-200	Replacement of capacitors, Paducah, Kentucky	0	0	4,000	4,400	8,400

1/ Excludes $15,000,000 transferred to the Energy Supply R&D Appropriation in prior years.
2/ Obligational authority totalling $20,000,000 was transferred via a reprogramming to the Gaseous Diffusion Operations and Support operating expenses in FY 1989.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Uranium Enrichment Activities

IV. A. Construction Project Summary

Project No.	Project Title	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Unappropriated Balance	TEC
91-U-201	Refurbish interim purge facility, Portsmouth, Ohio, gaseous diffusion plant	$ 0	$ 0	$ 1,400	$ 3,800	$ 5,200
91-U-206	Reduction of PCB contamination, Paducah, Kentucky and Portsmouth, Ohio	0	0	5,500	61,500	67,000
91-U-207	Roof upgrading, Portsmouth, Ohio, gaseous diffusion plant	0	0	3,800	18,000	21,800
91-U-208	Safeguards and security upgrading, Portsmouth, Ohio, gaseous diffusion plant	0	0	3,500	10,500	14,000
91-U-209	Process inventory control system, Phase II, Portsmouth, Ohio, gaseous diffusion plant	0	0	3,800	10,500	14,300
GPN-210	General plant projects, various locations	0	0	700	0	700
GPN-501	General plant projects, various locations	0	0	12,600	0	12,600
GPN-600	General plant projects, various locations	0	0	2,400	0	2,400
Total, Uranium Enrichment Construction		$ 61,500	$ 47,475	$70,800	$126,704	$306,479

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Account: United States Uranium Enrichment Corporation
TR Account-ID: 89-4453-2-3-271

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(obligations dollars in thousands)

OBJECT CLASS SUMMARY

Uranium Enrichment Activities

		FY 1989	FY 1990	FY 1991
Direct Funding:				
11.1	Full-time permanent			$ 3,280
11.5	Other Compensation			200
11.9	Total personnel compensation			3,480
12.1	Benefits			480
21.0	Travel			790
23.3	Communications, utilities, and miscellaneous charges			794,200
25.0	Other Services			557,505
31.0	Equipment			24,245
32.0	Land & Structure			70,800
43.0	Interest and dividends			29,000
99.0	Subtotal			1,480,500
	Reimbursables			0
Totals				$1,480,500

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Account: Uranium Supply and Enrichment Activities
TR Account-ID: 89-0226-0-1-271

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(obligations dollars in thousands)

OBJECT CLASS SUMMARY

Uranium Enrichment Activities

		FY 1989	FY 1990	FY 1991
Direct Funding:				
11.1	Full-time permanent	$ 2,829	$ 3,240	$ 3,280
11.3	Other than full-time	37	0	0
11.5	Other Compensation	86	187	200
11.8	Special Personal Services Payments	17	0	0
11.9	Total personnel compensation	2,969	3,427	3,480
12.1	Benefits	410	403	480
21.0	Travel	521	730	790
23.1	Rental Payments to GSA	77	0	0
23.2	Rental Payments to Others	63	283	193
23.3	Communications, utilities, and miscellaneous charges	867,600	877,638 2/	794,200
24.0	Printing and Reproduction	2	0	0
25.0	Other Services	363,025 1/	449,120	511,830
26.0	Supplies and materials	1	0	0
31.0	Equipment	21,799	17,916	24,245
32.0	Land & Structure	38,586	47,860	70,800
41.0	Grants, subsidies and contributions	76	0	0
99.0	Subtotal	1,295,129	1,397,377	1,406,018
	Reimbursables	0	0	0
Totals		$1,295,129	$1,397,377	$1,406,018

1/ Excludes $1,482,500 for S.B.I.R.; includes $20,000,000 appropriation transfer.
2/ Excludes $20,000,000 that returned to Departmental Administration.

Account: Uranium Supply and Enrichment Activities
TR Account-ID: 89-0226-2-1-271

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(obligations dollars in thousands)

OBJECT CLASS SUMMARY

Uranium Enrichment Activities

		FY 1989	FY 1990	FY 1991
Direct Funding:				
11.1	Full-time permanent			$ -3,280
11.5	Other Compensation			-200
11.9	Total personnel compensation			-3,480
12.1	Benefits			-480
21.0	Travel			-790
23.2	Rental Payments to Others			-193
23.3	Communications, utilities, and miscellaneous charges			-794,200
25.0	Other Services			-511,830
31.0	Equipment			-24,245
32.0	Land & Structure			-70,800
99.0	Subtotal			-1,406,018
	Reimbursables			0
Totals				$-1,406,018

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

LEAD TABLE

Uranium Enrichment Revenues

Activity	FY 1989 Actual Appropriation	FY 1990 a/ Appropriation	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Revenues						
Commercial	-$1,261,651	-$1,311,700 b/	-$1,311,700 b/	-$1,337,700	-$ 26,000	+2
Government	-169,000	-189,200 c/	-189,200 c/	-192,800 d/	-3,600	+2
Subtotal, Revenues	-1,430,651	-1,500,900	-1,500,900	-1,530,500	-29,600	+2
Adjustments for Current Estimate						
Commercial	0	+80,900	+80,900	0	-80,900	NA
Government	0	+2,818	+2,818	0	-2,818	NA
Total	-$1,430,651	-$1,417,182 b/c/	-$1,417,182 b/c/	-$1,530,500 d/	-$113,318	+8

a/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.
b/ The Department's FY 1990 budget to Congress estimated that FY 1990 revenue collections would be $1,514,000,000. However, the FY 1990 House and Senate appropriation bills include only $1,500,900,000 for enrichment revenues based on guidance from the Congressional Budget Office. The Department's current estimate is $1,417,182,000.
c/ The Department's FY 1990 revenue budget assumes $189,200,000 will be received from Government sources. The Gramm-Rudman sequester reduced the amount by $2,818,000; $2,534,000 for Defense Programs and $284,000 for Nuclear Energy.
d/ The Department's FY 1991 revenue budget assumes that revenues will be received from a number of Government programs based on their requirements for enrichment services.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

SUMMARY OF CHANGES

Uranium Enrichment Revenues

FY 1990 Appropriation	$-1,500,900
Adjustments	+83,718
FY 1991 Base	-1,417,182
Revenues	
o Increase in commercial revenues	-106,900
o Increase in Government revenues	-6,418
FY 1991 Congressional Budget Request	$-1,530,500

1188B

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
URANIUM ENRICHMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

URANIUM ENRICHMENT REVENUES

I. Preface: Uranium Enrichment Revenues

The estimate for uranium enrichment revenues includes the sale of uranium enrichment services for use in nuclear power reactors for foreign and domestic customers. Also included in this activity are the sale of enrichment services to other Government programs, advance payments received from customers, and miscellaneous revenues related to uranium enrichment activities.

The preparation of the Department's estimates of uranium enrichment revenue collections is a time consuming and complex process. This process starts with customer provided estimates of delivery requirements. However, the enrichment contracts do not require customers to provide firm orders for deliveries in the current fiscal year until 180 days before the end of the current fiscal year. While customers provide the Department with estimates of future requirements, they are not always reliable. In preparing revenue estimates for future years, the Department takes the customer provided information and modifies the data using information derived from the Nuclear Regulatory Commission reports on reactors, trade journals and industry periodicals, past experience with individual customers, reports on customer inventories and fuel cycles, known reactor shutdowns, licensing and initial power operations, trend data, foreign exchange rates, political concerns, etc. The data used in this process is quite dynamic and customer requirements and the Department's revenue estimates change accordingly.

II A. Summary Table

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request	% Change
Revenues				
Commercial	-$1,264,200	-$1,235,700	-$1,327,700	+7
Government	-169,000	-186,382	-192,800	+3
Advanced Payments	+20,000	+14,000	0	NA
Miscellaneous	-9,751	-5,100	-6,000	+18
Termination Charges	-7,700	-4,000	-4,000	0
Total, Uranium Enrichment Revenues	-$1,430,651	-$1,417,182	-$1,530,500	+8

II. B. Major Laboratory and Facility Funding

Not applicable.

III. Activity Description:

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
Revenues			
Commercial	Sale of about 11.4 MSWU to commercial customers. (-$1,264,200)	Sale of about 10.9 MSWU to commercial customers. (-$1,735,700) a/	Sale of about 11.1 MSWU to commercial customers. (-$1,327,700)

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111 Uranium Enrichment Revenues (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Government	Sale of about 1.0 MSAU to Defense Program customers. Funding will be provided by the Atomic Energy Defense Activities appropriation in DOE.	Sale of about 1.1 MSAU to Defense and other Government customers based on their requirements for enrichment services.	Sale of about 1.0 MSAU to Defense and other Government customers based on their requirements for enrichment services.
	(-$169,000)	(-$186,382) b/	(-$192,000) c/
Advanced Payments	Applicable credits against FY 1989 sales of toll enriching services for advance payments made in prior years.	Applicable credits against FY 1990 sales of toll enriching services for advance payments made in prior years.	No credits for advance payments made in prior years are expected in FY 1991.
	(+$20,000)	(+$14,000)	($0)
Miscellaneous	Packaging and handling charges, late payment charges, sales from deferred sales contracts, and related items.	Packaging and handling charges, late payment charges, sales from deferred sales contracts and related items.	Packaging and handling charges, late payment charges, sales from deferred sales contracts and related items.
	(-$9,751)	(-$5,100)	(-$6,000)
Termination Charges	Revenues from termination charges associated with the cancellation of commercial SWU sales.	Revenues from termination charges associated with the cancellation of commercial SWU sales.	Revenues from termination charges associated with the cancellation of commercial SWU sales.
	(-$7,700)	(-$4,000)	(-$4,000)
Total, Uranium Enrichment Revenues	($-1,439,651)	($-1,417,182) a/b/	($-1,530,500) c/

a/ The Department's FY 1990 budget to Congress estimated that FY 1990 revenue collections would be $1,514,000,000. However, the FY 1990 House and Senate appropriation bills include only $1,500,900,000 for enrichment revenues based on guidance from the Congressional Budget Office. The Department's current estimate is $1,417,182,000.

b/ The Department's FY 1990 revenue budget assumes $189,200,000 will be received from Government sources. The Gramm-Rudman sequester reduced the amount by $2,818,000: $2,534,000 for Defense Programs and $284,000 for Nuclear Energy.

c/ The Department's FY 1991 revenue budget assumes that revenues will be received from a number of Government programs based on their requirements for enrichment services.

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VOLUME 3

ISOTOPE PRODUCTION AND DISTRIBUTION FUND

1189

PROPOSED APPROPRIATION LANGUAGE

Isotope Production and Distribution Program

(For necessary expenses of activities related to the production, distribution and sale of isotopes and related services, $16,243,000, to remain available until expended: Provided, That this amount, and notwithstanding 31 U.S.C. 3302, revenues received from the disposition of isotopes and related services shall be credited to this account to be available for carrying out these purposes without further appropriation: Provided further, That all unexpended balances of previous appropriations made for the purpose of carrying out activities related to the production, distribution and sale of isotopes and related services may be transferred to this fund and merged with other balances in the fund and be available under the same conditions and for the same period of time: Provided further, That fees shall be set by the Secretary of Energy in such a manner as to provide full cost recovery, including administrative expenses, depreciation of equipment, accrued leave, and probable losses: Provided further, That all expenses of this activity shall be paid only from funds available in this fund: Provided further, That at any time the Secretary of Energy determines that moneys in the fund exceed the anticipated requirements of the fund, such excess shall be transferred to the general fund of the Treasury.) Revenues received hereafter from the disposition of isotopes and related services shall be credited to this account, to be available for carrying out the purposes of the isotope production and distribution program without further appropriation. Provided, that such revenues and all funds provided under this head in Public Law 101-101 shall remain available until expended.

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EXPLANATION OF CHANGE

The proposed language will ensure retention of revenues received hereafter for use in funding isotope production, sale and distribution activities of the Department.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ISOTOPE PRODUCTION AND DISTRIBUTION PROGRAM FUND

OVERVIEW

The Department, through the Isotope Production and Distribution program, provides radioactive and stable isotope products and associated services to a wide and varied domestic and international market. These materials and services are produced, processed and provided through the utilization of DOE facilities and scientific capabilities, which exist to satisfy other DOE research and production missions. Ultimate applications of isotope products include medical research and health care, industrial research and manufacturing, agriculture, food preservation, education, and national defense. Prices for the products are established to recover program costs while revenues realized from the sales are retained by the program as an offset to costs and investments in processes, improvements, unique equipment, and isotope research.

The FY 1990 Appropriations Act P.L. 101-101 authorized a separate Isotope Production and Distribution account with an initial capitalization of $16.2 million and the ability to retain revenues. The revenues are estimated to be $16.2 million in FY 1990.

A DOE Headquarters management organization has recently been established for the Isotope Program. The FY 1991 sales/production and budget forecasts are being formulated in conjunction with the operating plan development.

The Program consists of three major categories of isotope products: Radioisotopes, Electromagnetically Enriched (EM) Stable Isotopes, and Non-EM Enriched Stable Isotopes.

Radioisotopes include radioactive materials specifically produced in DOE reactors and accelerators and byproducts materials. The radioisotopes offered vary widely in half-life, physical and chemical form, and production batch size. EM stable isotopes are separated in the Electromagnetic Isotope Enrichment Facility (Calutrons) at Oak Ridge National Laboratory (ORNL), TN. The quantities produced, enrichments, and prices vary widely. Radioisotopes are produced or originate from a variety of DOE sites including the Idaho National Engineering Laboratory, Los Alamos National Laboratory (LANL), Brookhaven National Laboratory, Argonne National Laboratory, Hanford, and ORNL. Both radioisotopes and EM stable isotopes are sold by the ORNL sales office, although some are shipped directly to customers from the production site. Non-EM enriched stable isotopes are routinely produced at Mound Plant, OH, LANL, NM, and have also been produced at the Savannah River Plant, SC, and the gas centrifuges at the Oak Ridge Gaseous Diffusion Plant, TN. These products are sold through the Mound sales office.

DOE, in keeping with government policies and practices, sets prices for products offered under this program in a manner that will not discourage the use of the products nor the development of domestic sources of supply independent of DOE. The enriched stable isotopes and a few of the radioisotopes are amenable to production, storage, and distribution on an inventory basis, but many radioactive isotopes must be produced frequently or on demand because of their rapid decay. There are no prepackaged quantities, so each order must be packaged individually.

Isotope related services that are provided may be associated with the products sold or may involve the preparation of specialized physical forms. Such items include, but are not limited to, reactor dosimeters, thin foils, "doped" materials, and coatings. These items are user specific, made to individual specifications, and primarily used for research. Product related services include source encapsulation, special purification, preparation of nonstandard chemical or physical forms, special packaging for radioactive material and special separations, special analysis and testing, services related to shipping, and processing of returned isotopes.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ASSISTANT SECRETARY FOR NUCLEAR ENERGY
(dollars in thousands)

LEAD TABLE

Isotope Production and Distribution Program

Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
Isotope Production Operating Expenses	$16,243A/	$16,016B/C/	$16,016	$16,243	$ 227	1%
Receipts from Isotope Sales	16,452	16,225D/	$16,225	$16,243	$ 18	0%
Staffing (FTE's)	0	2	2	2		

A/ FY 1989 shows comparability amounts for the Isotope Production and Distribution Program which was previously funded through Departmental Administration and Energy Research.
B/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.
C/ Represents establishment of the fund under P.L. 101-101.
D/ The funding reflected for receipts in FY 1990 and FY 1991 makes these funds available for anticipated requirements of the Isotope Production and Distribution Program.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ISOTOPE PRODUCTION AND DISTRIBUTION PROGRAM
(dollars in thousands)

SUMMARY OF CHANGES

ISOTOPE PRODUCTION AND DISTRIBUTION PROGRAM

FY 1990 Appropriation/FY 1991 Base	$ 0
Isotope Production - Operating Expenses	
- Initial capitalization of the fund	$16,016
Receipts from Isotope Sales	$16,225

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ISOTOPE PRODUCTION AND DISTRIBUTION PROGRAM
(dollars in thousands)

KEY ACTIVITY SUMMARY

ISOTOPE PRODUCTION AND DISTRIBUTION PROGRAM

I. Preface: Isotope Production and Distribution Program

The Department, through the Isotope Production and Distribution program, currently provides radioactive and stable isotope products and associated services to a wide and varied domestic and international market. Ultimate applications of the isotope products include health care, research in virtually every scientific discipline, education, industrial use, agriculture applications, and national defense. DOE's isotopes are produced at several different sites and distributed through sales offices located at DOE's Mound Plant, Ohio, and Oak Ridge National Laboratory, Tennessee.

A fund was established in FY 1990 for use in funding isotope production, sale and distribution activities, and related efforts including, federal personnel compensation, benefits, travel, and other expenses for 2 FTE's in FY 1990 and FY 1991. Program oversight has been assigned to the Office of Nuclear Energy. Prior to FY 1990, funding for the isotope program was provided from a number of DOE accounts, principally the Office of Management and Administration and the Office of Energy Research.

II. A. Summary Table

Program Activity	FY 1990 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request	$ Change
Isotope Production - Operating Expenses	$ 16,243	$ 16,016 a/	$ 16,243	1
Receipts from Isotope Sales	-16,452	-16,220 b/	-16,243	-1
Total	$ -209	$ -204	$ 0	-100

a/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments.

b/ The funding reflected for receipts in FY 1990 makes those funds available for anticipated requirements of the Isotope Production and Distribution program.

II. B. Major Funding

Isotope Production	$16,243	$16,016	$16,243	1

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III. Isotope Production

Program Activity	FY 1989 Actual Appropriation	FY 1990 Appropriation	FY 1991 Request
Isotope Production	Produce a variety of stable and radioactive isotopes for extramural sales and inventory replacement at ORNL. Includes special enrichments, special irradiations, processing, packaging, handling and shipping of products by ORNL.	Produce a variety of isotopes for extramural sales and inventory replacement. Includes special enrichments, processing, packaging, handling and shipping of products.	Produce a variety of stable and radioactive isotopes for extramural sales and inventory replacement. Includes special enrichments, special irradiations, processing, packaging, handling and shipping of products.
	Produce noble gas, chlorine, bromine, and sulfur isotopes at Mound and oxygen and nitrogen isotopes at Los Alamos National Laboratory (LANL). Continue krypton and xenon enrichment as required.	Produce noble gas, chlorine, bromine, and sulfur isotopes at Mound and oxygen, carbon, and nitrogen isotopes as required to meet demand. Continue krypton and xenon enrichment as required.	Produce noble gas, chlorine, bromine, sulfur isotopes and other stable isotopes as required to meet demand. Continue krypton and xenon enrichment as required.
Subtotal, Isotope Production	$16,243	$16,016	$16,243
Receipts from Isotope Sales	Sale of radioactive and stable isotopes, handling charges, and miscellaneous products and services at ORNL and Mound. $16,452	Sale of radioactive and stable isotopes, handling charges, and miscellaneous products and services. $16,225	Sale of radioactive and stable isotopes, handling charges, and miscellaneous products and services. $16,243
Total, Isotope Production and Distribution	$ (209)	$ (209)	$0

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ISOTOPE PRODUCTION AND DISTRIBUTION PROGRAM
(obligations dollars in thousands)

OBJECT CLASS SUMMARY

Direct Funding:	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request
11.1 Full-time permanent		$ 164	$ 315
11.5 Other compensation		1	1
11.9 Total personnel compensation		165	316
12.1 Benefits		17	35
21.0 Travel		15	20
25.0 Other services		15,819	15,872
99.9 Total Obligations	----	$16,016	$16,243

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VOLUME 3

NUCLEAR WASTE DISPOSAL FUND

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
NUCLEAR WASTE FUND

PROPOSED APPROPRIATION LANGUAGE

For nuclear waste disposal activities to carry out the purposes of Public Law 97-425, as amended, including the acquisition of real property or facility construction or expansion, [$346,000,000] $292,811,000, to remain available until expended, to be derived from the Nuclear Waste Fund. To the extent that balances in the fund are not sufficient to cover amounts available for obligation in the account, the Secretary shall exercise his authority pursuant to section 302(e)(5) of said Act to issue obligations to the Secretary of the Treasury: Provided, That [any proceeds resulting from the sale of assets purchased from the Nuclear Waste Fund shall be returned to the Nuclear Waste Fund: Provided further, That] of the amount herein appropriated not exceed $5,000,000, may be provided to the State of Nevada, for the conduct of its oversight responsibilities pursuant to [the Nuclear Waste Policy Act of 1982, Public Law 97-425, as amended that] the Act: [of which $1,000,000 is to be available for the University of Nevada-Reno to carry out infrastructure studies related to nuclear waste, and of which not more than $1,000,000 may be expended for geology and hydrology studies carried out by the University of Nevada system and not more than $1,000,000 may be expended for socioeconomic and transportation studies: Provided further, That not more than $6,000,000 may be provided to the State of Nevada, at the discretion of the Secretary of Energy, to conduct appropriate activities pursuant to the Act:] Provided further, That not more than $5,000,000, may be provided to affected local governments, as defined in the Act, to conduct appropriate activities pursuant to the Act: Provided further, That none of the funds herein appropriated may be used directly or indirectly to influence legislative action on any matter pending before Congress or a State legislature or for any lobbying activity as provided in 18 U.S.C. 1913[: Provided further, That of the amount appropriated herein, up to $10,000,000 shall be made available to the University of Nevada, Las Vegas (UNLV), to provide computing resource to the State of Nevada to carry out its independent analyses and oversight responsibilities under the Nuclear Waste Policy Act of 1982 and for use by UNLV. The funds shall be made available by direct payment to UNLV in the amount of the purchase price of a supercomputer or coupled minisupercomputers. UNLV shall take title to and assume ownership of the computer hardware and software that are purchased with these funds]. (Energy and Water Development Appropriations Act, 1990.)

OVERVIEW

To accomplish the stated mission, the program will conduct activities in each of the sub program summarized in the overview and detailed in the narrative.

First Repository. Yucca Mountain, Nevada, has been designated by the Nuclear Waste Policy Act as Amended (NWPAA) as the candidate site for detailed site characterization activities to determine whether or not the site would be suitable for a high-level waste repository. In order to characterize the Yucca Mountain site, a number of critical activities must be accomplished. These activities include issuance of a Site Characterization Plan and conduct of public hearings; conduct of geologic, hydrologic, geochemical, socioeconomic, and environmental evaluations; design and construction of an exploratory shaft facility; conduct of an in situ test program in the exploratory shaft facility; and environmental and socioeconomic monitoring during site characterization and mitigation of a significant adverse impacts. In the areas of outreach and participation with the affected State and other affected parties recognized by the NWPA, as amended, activities include negotiation of a consultation and cooperation agreement, implementation of a program of grants and payments equal to taxes and, if desired by the State, negotiation of a benefits agreement. Other critical activities include the design and development of a waste package; development of a repository design; intense interactions with the Nuclear Regulatory Commission; and scoping and preparation of the Environmental Impact Statement and license application preparation. Cooperative international efforts of benefit to the site characterization program at Yucca Mountain will be conducted where they are cost effective.

Monitored Retrievable Storage. The NWPAA authorizes a Monitored Retrievable Storage (MRS) facility as integral part of the overall waste management system and places certain conditions on its siting, construction and operation. Prior analyses of the optimal role which an MRS may play and certain MRS design features, including process flows, will be updated consistent with the NWPAA and in light of the MRS Review Commission report. In addition, grants to States, Indian Tribes, or units of local government to assess the feasibility of potential sites in their jurisdictions are authorized. MRS activities are authorized and will be implemented. Preparation for site specific definitive design and licensing will begin.

Transportation and Systems Integration. Development and operations of a safe, efficient transportation system is critical to the overall development of an integrated waste management system. Tasks required to meet this responsibility will provide for the full institutional development of an integrated transportation system and the technical development and operation of the system. In developing and operating this system, private industry will be utilized to the maximum extent possible, as mandated by the NWPA. Systems integration efforts benefit the total waste management program by facilitating the successful integration of the discrete program elements (i.e., mined geologic repository, transportation, and an MRS facility) into a cohesive, efficient, safe, and timely waste management system. Specific critical activities that must continue in order to develop the waste transportation system include transportation systems acquisition, the development and testing of transportation casks, institutional activities, environmental and economic analysis, and the development of various prototypical consolidation, packaging, and handling hardware.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
(dollars in thousands)
LEAD TABLE

Nuclear Waste Fund

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs Base: Dollar	Program Change Request vs Base: Percent	FY 1992 Request	FY 1993 Request
First Repository								
Operating expenses	$223,700	$176,058	$176,058	$183,220	$7,162	4.1%	$386,633	$494,774
Capital Equipment	0	0	0	10,000	10,000	100.0%	17,247	18,844
Subtotal, First Repository	223,700	176,058	176,058	193,220	17,162	9.7%	403,880	513,618
Monitored Retrievable Storage								
Operating expenses	15,000	3,000	3,000	10,000	7,000	233.3%	69,250	45,723
Trans., Syst. Int., & E.D.								
Operating expenses	40,800	21,700	21,700	29,980	8,280	38.2%	57,409	58,428
Capital Equipment	200	300	300	300	0	100%	300	300
Subtotal, Trans., Syst. Int., & E.D.	41,000	22,000	22,000	30,280	8,280	37.6%	57,709	58,728
Program Management & Tech. Support								
Operating expenses	71,432	65,498	65,498	57,733	-9,265	-13.8%	96,941	99,855
Capital Equipment	700	1,500	1,500	1,600	100	100%	3,500	3,500
Subtotal, Program Mgmt. & Tech. Support	72,132	66,998	66,998	59,333	-7,665	-11.4%	100,441	103,355
TOTAL PROGRAM	351,832	268,056	268,056	292,833			631,280	721,424
Nuclear Regulatory Commission Fees	15,000	27,100	27,100	0	-27,100	-100.0%	0	0
TOTAL NUCLEAR WASTE FUND	$366,832	2) $295,156	$295,156	$292,833	-2,323	-1.0%	$631,280	$721,424
Outyear Funding Adjustment 1)							-328,150	-408,482
Total Nuclear Waste Fund Outyears							$303,130	$312,942
Staffing (FTEs)	268	249	250	250	---	---	319	319

1) Outyear numbers will be re-evaluated prior to formal submittal of the FY 1992 budget and either requirements will be adjusted or the amount provided will be increased based on the actual needs of the program.

2) FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and P.L. 101-164 reductions to fund anti-drug activities.

Authorization: Section 31, P.L. 83-703, P.L. 97-425, and P.L. 100-203

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	Projected Receipts by Fiscal Year (dollars in thousands)						
	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995
One mil/kWh fee	1/ $524,500	2/ $532,200	2/ $549,000	2/ $562,900	2/ $568,900	2/ $576,900	2/ $579,300
One-time fee	1/ 6,000	6,000	6,000	6,000	6,000	6,000	6,000
Total	$530,500	$538,200	$555,000	$568,900	$574,900	$582,900	$585,300
Interest Income	1/ $165,700	3/ $193,900	3/ $220,000	3/ $222,100	3/ $218,500	3/ 215,200	3/ 212,500

1/ Based on actual FY 1989 receipts/income.

2/ Based on projected net nuclear electricity generation as a result of the Wisconsin court decision; Wisconsin Electric Power Company, et al vs. Hodel, 84-8571; decided December 6, 1985. Does not reflect the court decision; Consolidated Edison vs. DOE; decided March 17, 1989.

3/ Based on projected average yield of Treasury security portfolio.

Note: Receipt estimates for the one mil/kWh fee were derived from the Energy Information Administration's Nuclear Waste Fund Revenue Projections through FY 1993. (Based on the September 27, 1989, revised projections.)

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
NUCLEAR WASTE FUND
(dollars in thousands)
SUMMARY OF CHANGES

FY 1990 Appropriation	$346,000
Adjustments - Drug Prevention Reduction pursuant to P.L. 101-164	-46,000
Gramm-Rudman-Hollings Defecit Reduction pursuant to P.L. 99-177	- 4,844
FY 1991 Base	$295,156

First Repository

Increase to fund a limited drilling program to conduct scientific investigations of Yucca Mountain, focused on surface-based testing for an early indication of site suitability; continue support of the exploratory shaft factility (ESF) Title II design activities; complete the ESF Alternative Strategies Studies; maintain an NRC accepted quality assurance program; and provide for a modest program expansion in the areas of regulatory, institutional and environmental ..... $ 17,162

Monitored Retrievable Storage

Increase due to the initiation of generic conceptual design efforts and initiation of siting activities, as well as grants to States, Indian Tribes or units of local government to assess the feasibility of siting an MRS in their jurisdiction ..... + 7,000

Transportation and Systems Integration

Although there is an increase in new Budget Authority of $8,280,000, the sub program received a lower total availability for FY 1991 than in FY 1990. As explained in the Key Activity Summary, the FY 1990 budget activities were partially funded with $10,500,000 of prior year carryover..... + 8,280

Program Management and Technical Support

Decrease due to reduction of Repository Licensing Support System equipment purchases.... - 7,665

Nuclear Regulatory Commission Fees

Decrease due to policy changes requiring that NRC request funds directly through the budget process for licensing activities. ..... - 27,100

FY 1991 Congressional Budget Request..... $292,833

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
NUCLEAR WASTE FUND
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR WASTE FUND

I. Preface: First Repository

With passage of the Nuclear Waste Policy Amendments Act in December 1987, the tuff candidate site at Yucca Mountain, Nevada, was selected for detailed characterization to evaluate site suitability. Characterization of the candidate Yucca Mountain site will involve a program of surface-based tests, including the collection and analysis of geologic, hydrologic, and geochemical data; environmental and socioeconomic evaluation; the construction of an exploratory shaft facility and the conduct of the in situ test program within the facility; the design and development of a waste package; a design and development of a repository; intensive institutional interactions with the State of Nevada and affected local governments; payments equal to taxes to the State of Nevada and appropriate local jurisdictions; financial assistance for characterization and mitigation and oversite by the State of Nevada; implementation of the Benefits Agreements Program; interactions with the Nuclear Regulatory Commission; and project management activities including a rigorous quality assurance program to ensure that all aspects of the work are conducted effectively and efficiently. If the tuff candidate site is found suitable and is designated as the repository site, this site characterization program will culminate with the submission of a license application to the Nuclear Regulatory Commission to construct a high-level nuclear waste repository. In addition to the site-specific work to be implemented, technical support activities will be continued, including evaluation of waste package designs and compliance strategies; geoscientific analysis; risk assessments; Materials Characterization Center tasks related to spent fuel and high-level waste forms; development and analysis of performance assessment models; and defense high-level waste design and performance studies. In addition, cooperative international efforts of benefits to the site characterization program at Yucca Mountain will be conducted where they are cost effective.

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II. A. Summary Table: First Repository

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change	FY 1992 Request	FY 1993 Request
Systems	$ 21,298	$ 21,271	$ 19,240	- 10	$ 36,682	$ 35,550
Waste Package	16,568	9,660	9,160	- 5	17,160	28,198
Site	44,545	36,614	42,485	+ 16	84,947	101,495
Repository	15,145	12,227	10,050	- 18	62,541	97,800
Regulatory/Institutional	20,368	21,562	20,840	- 3	31,277	34,840
Exploratory Shaft	26,132	12,000	15,000	+ 25	30,000	60,510
Test Facilities	10,782	16,235	12,400	- 24	26,400	21,400
Project Management	41,853	28,889	46,445	+ 61	59,225	73,225
Financial and Technical Assistance	27,009	17,600	17,600	0	55,648	60,600
Total, First Repository	$ 223,700	$ 176,058	$ 193,220	+ 10	$ 403,880	$ 513,618

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II. B. Major Laboratory and Facility Funding:

	FY 1989	FY 1990	FY 1991	% Change	FY 1992	FY 1993
Argonne National Laboratory (ANL)	2,070	2,105	1,940	-8%	4,040	4,472
Brookhaven National Laboratory (BNL/CH)	1,650	0	0	0%	0	0
Chicago Operations Office	6,250	6,467	6,547	1%	13,634	15,092
Los Alamos National Laboratory (LANL)	18,516	14,200	16,280	15%	33,903	37,551
Lawrence Berkeley Laboratory (LBL)	3,769	3,123	3,181	2%	6,624	7,333
Lawrence Livermore National Laboratory (LLNL)	17,946	12,487	14,008	12%	29,172	32,292
Nevada Operations Office	103,092	75,480	94,056	25%	195,854	216,804
Oak Ridge National Laboratory (ORNL)	3,455	522	673	29%	1,401	1,551
Pacific Northwest Laboratory (PNL/BRI)	8,620	4,480	4,090	-9%	8,517	9,428
Sandia National Laboratory (SNL)	22,883	22,846	24,919	9%	51,894	57,445
U.S. Geological Survey (NVO)	21,349	20,431	23,179	13%	48,271	53,434

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
First Repository					
Systems	Reviewed and updated the technical data base. Updated the Reference Information Base (RIB). Continued to perform preliminary Performance Assessment (PA) analysis. Completed definition of scoping problems for FY 1990 exercise. Issued reports on Cave 2A benchmarking 1 and developed preliminary estimates of ground-water travel time (GWTT) based on current data. Continued model development work on preclosure source term and preliminary scenario classes. Continued to perform prototype development of repository thermal/mechanical tests. Issued formal release of the waste	Update systems requirements and system description documents. Review and update the technical data base and the RIB. Continue to perform preliminary PA analysis. Issue report on preliminary system models of radionuclide releases through water pathways. Issue report on repository situations that affect performance. Complete scoping and sensitivity studies for total system, engineered systems and natural barriers. Continue benchmarking and verification of codes and validation of models. Evaluate data requirements for GWTT. Continue and phaseout model development work on source term and preliminary scenario	Continue conducting systems engineering studies in support of Advanced Conceptual Design (ACD). Review and update cost estimates to support the repository ACD life-cycle cost estimate. Update study register for start of repository ACD. Continue conducting systems engineering studies. Continue review and update of technical data base and the RIB. Continue to perform preliminary PA analysis. Continue benchmarking and verification of codes and validation of models. Complete a Performance Assessment Implementation Plan (PAIP) for FY 1992 activities. Update EQ3/6 data base with	Continue conducting systems engineering studies. Issue repository ACD life-cycle cost estimate. Prepare repository initial cost estimates for ACD. Continue review and update of technical data base and the RIB. Continue study on radionuclide transport through rock. Continue bench-marking and verification of codes and validation of models. Continue work on GWTT model and develop PA codes. Restart model development work on preclosure source term and scenario classes. Complete a Performance Assessment Implementation Plan (PAIP) for FY 1993 activities. Continue	Initiate and issue preliminary report on post waste emplacement radionuclide transport through rock near waste package. Continue conducting systems engineering studies. Update repository life-cycle cost estimate. Continue review and update of technical data base and the RIB. Continue study on radionuclide transport through rock. Continue bench-marking and verification of codes and validation of models. Continue model development work on preclosure source term and scenario classes. Continue repository performance assessment. Establish configuration control of ESF drawings

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III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Systems (Cont'd)	package EQ3/6 code manual. Reviewed and updated EQ3/6 data base for accuracy and documentation. Developed and issued the Configuration Management Plan (CMP). Continued development of the Site and Engineering Properties Data Base. Reviewed the RIB Benchmark 4 for use in ESF Title II design.	classes. Continue waste package EQ3/6 data base development. Complete a performance Assessment Implementation Plan (PAIP) for FY 1991 activities. Analysis of the waste package and PA uncertainty, methodology and system model for ACD will be ongoing. Complete development and implementation of the Configuration Information System (CIS). Implement the Systems Engineering Management Plan (SEMP), and the CMP.	Nuclear Energy Agency data and issue updated version. Continue preparation of waste package PA methodology. Analysis of waste package and PA uncertainty and system model for support of design basis for ACD will continue. Initiate field change control.	waste package PA and uncertainty analysis and issue report for ACD. Update EQ3/6 code and data base. Iterate PACE calculations with updated models and newly acquired site data. Continue use of performance assessment to guide surface-based investigations.	and specifications. Prepare repository preclosure safety sturdy to support ACD performance confirmation. Continue maintenance efforts of the EQ3/6 code. Complete a Performance Assessment Implementation Plan (PAIP) for FY 1994 activities. Iterate PACE calculations with updated models and newly acquired site data. Continue use of performance assessment to guide surface-based investigations.
	Maintained the Systems Engineering Management Plan and procedures and maintained and controlled the technical baseline.	Continue essential maintenance of the Systems Engineering Management Plan and procedures. Maintain and control the technical baseline. Conduct PA Calculational Exercise calculations.	Maintain the Systems Engineering Management Plan and procedures. Control and maintain the technical baseline. Refine Preliminary Performance Allocations by utilizing new data obtained from surface-based testing, and revise plans for additional testing as appropriate. Iterate PA Calculational Exercise calculations with newly acquired site data.	Continue maintenance of the Systems Engineering Management Plan and procedures. Continue maintenance and control of the technical baseline to support the license application which will be submitted to the U.S. Nuclear Regulatory Commission and to support performance assessment.	Continue maintenance of the Systems Engineering Management Plan and procedures. Continue maintenance and control of the technical baseline to support the license application which will be submitted to the U.S. Nuclear Regulatory Commission and to support performance.

III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Systems (Cont'd)	$ 21,298	$ 21,271	$ 19,240	$ 36,682	$ 35,550
Waste Package	In the Waste Package area, continued waste forms and materials and waste package environment testing program. Continued the container material selection criteria report for the ACD. Continued the horizontal prototype engineered barrier design testing and initiated plans for vertical testing. Developed a draft Waste Package Design Requirement (WPDR). Completed the Waste Package Strategy Document.	Continue limited waste forms and materials testing and modeling and waste package environment testing programs. Complete selected ongoing spent fuel oxidation tests. Select the container material from the six candidates. Complete cost estimate for current conceptual design. Complete Waste Package Program Plan. Complete summary report of the G-Tunnel horizontal prototype test.	Continue the testing and modeling of selected container materials. Define preliminary waste form and waste package environmental characteristics. Update design requirements. Continue limited laboratory testing to characterize waste form and near-field environment.	Complete Waste Package Design Requirement document for ACD. Complete definition of design options. Continue waste forms and materials testing activites. Continue degradation mode modeling of selected materials. Continue characterization of waste package environment. Develop analytical capabilities and conduct design analysis to support start of ACD.	Continue waste form, environment, and materials testing and modeling. Initiate ACD and develop alternative design optons. Initiate prototype fabrication. Update waste form and environmental characteristics.
	Maintained the integrated management control system insuring that appropriate quality assurance controls are applied to waste package activities; applied control procedures essential to waste form testing, waste package performance assessment, and waste package development. Continued QA staff participation in reviews of all design input and output documentation	Continue essential maintenance of the integrated management control system insuring that appropriate quality assurance controls are applied to waste package activities; continue to apply control procedures to waste form testing, waste package performance assessment and waste package development. Continue QA staff participation in reviews of	Maintain the integrated management control system insuring that appropriate quality assurance controls are applied to waste package activities. Continue to apply control procedures to waste form testing, waste package performance assessment and waste package development. QA staff participation in reviews of all design input and output documentation	Continue maintenance of the integrated management control system insuring that appropriate quality assurance controls are applied to waste package activities. Continue to apply control procedures to waste form testing, waste package performance assessment and waste package development. QA staff participation in reviews of all design input and output	Continue maintenance of the integrated management control system insuring that appropriate quality assurance controls are applied to waste package activities. Continue to apply control procedures to waste form testing, waste package performance assessment and waste package development. QA staff participation in reviews of all design input and output

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III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Waste Package (Cont'd)	associated with waste package.	documentation associated with waste package.	associated with waste package continues.	documentation associated with waste package continues.	documentation associated with waste package continues.
	$ 16,568	$ 9,660	$ 9,160	$ 17,160	$ 28,198
Site	At the Yucca Mountain Site (YM), geologic, tectonic/seismologic, hydrologic, and geochemical investigations and monitoring were continued. Site characterization (SC) study plans were prepared. Eight study plans were sent to the Nuclear Regulatory Commission (NRC) for review. Prepared responses to the State of Nevada comments on the Site Characterization Plans Consultation Draft (SCP/CD) and began preparation of the statutory SCP comments response document. Prepared input data and participated in the Technical Review Board (TRB), State of Nevada and the NRC workshop. Completed final reports on dust collection hazard and air coring prototype tests including wet and dry drilling in G-Tunnel.	Continue ongoing and initiate new non-surface disturbing site characterization activities in the field and laboratory including prerequisite work and study plans in geological, hydrological, geochemistry, and climate areas. Continue operations of sample management facility and studies of old core. Accept and test LM-250 drilling in preparation for unsaturated zone dry drilling on the Yucca Mountain Site. Complete off-site prototype drilling in Arizona. Continue monitoring of site climate seismological, and hydrological conditions. Prepare to commence surface-disturbing field activities in January 1991, including Midway Valley Trenching and Calcite-Silica studies in and adjacent to Trench 14.	With receipt of the necessary environmental permits from the State of Nevada, DOE will initiate SBT. The program of ongoing geologic, hydrologic, and geochemical ivestigations will continue at Yucca Mountain. Monitoring of climate, seismological, and hydrologic conditions will be continued. Study plans for new studies in climate hydrology and geology will be finalized. Sample Management Facility will continue operations. Volcanism and geochronologic studies will continue. Laboratory testing and analysis will continue at present levels. Integration and documentation of site data will be continued in support of the DEIS and repository and waste package design. An overall assessment of the potential for	Geologic, hydrologic, and geochemical investigations will continue at Yucca Mountain. One additonal LM-250 drill rig will be ordered to bring the dry drilling program to full strength. Multi purpose borehole drilling and instrumentation will be completed. Geologic and geophysical data will be analyzed. Sub-surface geochemical testing will continue on core obtained in site characterization activities. Trenching will continue in quaternery fault investigations. Unsaturated zone boreholes will be drilled and infiltration testing will continue. Drilling and other surface-disturbing work will accelerate during the year ramping up to full 24-hour multi-location activity	Geologic, hydrological, geochemical, and climate investigations will continue at Yucca Mountain. Corehole drilling will continue at an increased level in FY 1992. Monitoring of hydrologic boreholes will continue and laboratory testing of core for hydrologic, geologic, and geochemical characterization will continue. Data will be incorporated into hydrologic and tectonic models and analysis of data from the field program will continue. Dry hole drilling will be nearly complete for unsaturated zone holes and well underway for waterfalls and SD holes. Midway Valley trenching will be completed. Infiltration studies will continue. Mapping and measurements in ESF opening will start. Data for site geologic description will be

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III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Site (Cont'd)	Drilled prototype hole using dual-wall, dry-coring drilling techniques in G-Tunnel. Started preparations to initiate surface drilling operations. Initiated prototype drilling in off-site locations in Utah. Completed documentation supporting existing data on rock properties. Completed codes for predicting ground-motion attenuation in the vicinity of YM from underground nuclear explosions. Initiated studies to evaluate past, present, and future climatological and meteorological Conditions at YM. Start operation of sample management facility.	Integration and documentation of site data will be incorporated in revised Surface-based Investigation Plan and entered into data bases in support of the Draft Environmental Impact Statement (DEIS).	mineral, hydrocarbon and geothermal resources will be initiated. Continue to develop, implement, and maintain the procedures to insure that all YMPO project actions associated with site investigations, including those associated with the ESF, are conducted in accordance with applicable technical and quality assurance requirements and to insure that such actions do not compromise the suitability of the site. Included in this are the management controls for the control of all site investigation samples (solid, liquid, and gaseous).	at year end. Initiate volcanic holes drilling and conventional drilling geologic holes. Laboratory measurements on core will continue at a higher level and geochemical investigations on retardation, solubility, and colloids will continue. Integration and documentation of site data will be continued in support of the DEIS and the LA. Meteorology, climatology and seismology studies will continue. Resource potential monitoring and testing will continue, and report on the effects of water withdrawal on the groundwater local flow system will be issued. Continue to develop, implement and maintain the procedures to insure that all YMPO Project actions associated with site investigations, including those associated with the ESF, are conducted in accordance with applicable technical and quality assurance requirements and to insure that such	entered into data bases for analysis. Probalistic seismic hazard assessment for surface facilities will be updated. Documentation of site data will be continued in support for the preparation of the LA. Issue a seismic hazard update and a review of historical seismicity. Continue to develop, implement, and maintain the procedures to insure that all YMPO Project actions associated with site investigations, including those associated with the ESF, are conducted in accordance with applicable technical and quality assurance requirements and to insure that such actions do no compromise the suitability of the site. Included in this are the management controls for the control of all site investigation samples (solid, liquid, and gaseous).

III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Site (Cont'd)				actions do not compromise the suitability of the site. Included in this are the management controls for the control of all site investigation samples (solid, liquid, and gaseous).	
	Continued development, implementation, and maintenance of procedures to insure that all YMPO project actions associated with site investigations, including those associated with the Exploratory Shaft Facility, are conducted in accordance with applicable technical and quality assurance requirements, and to insure that such actions do not compromise the suitability of the site. Included in this are the management controls for the control of all site investigation samples (solid, liquid, and gaseous). Site activities utilized $27,874 of prior year unobligated funds.	Continue to develop, implement and maintain the procedures to insure that all YMPO project actions associated with site investigations, are conducted in accordance with applicable technical and quality assurance requirements, and to insure that such actions do not compromise the suitability of the site. Included in this are the management controls for the control of all site investigation samples (solid, liquid, and gaseous).			

III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Site (Cont'd)	$ 44,565	$ 36,614	$ 42,485	$ 84,947	$ 101,495
Repository	In the Repository area, completed sealing requirements for ACD. Continued laboratory tests of rock thermal and mechanical properties and updated the data bases. Completed the required pre-ACD repository facility engineering studies and the draft Repository Design Requirement (RDR) document for the ACD. Completed ES Study Plan development and reviews. Completed investigations of the effects of ESF on repository performance assessment.	Start Repository Program Plan preparation. Develop alternative repository and ESF configurations to promote integration of the ESF into the repository. Study results will be applied to further design of the ESF. Begin modification of RDR in accordance with the results of the ESF alternatives evaluation study. Prepare Mechanical Properties Study Plan. Continue to conduct laboratory test of rock thermal and mechanical properties and update the data bases. Continue the development of design methods and computer codes to be employed in the design of the ESF and the repository. Complete retrievability compliance strategy plan. Start repository sealing studies.	Procure A/E service for Repository design. Complete evaluation of waste package emplacement orientation and select reference orientation for repository design. Complete update of Repository Design Requirements document for ACD. Continue to conduct laboratory tests of rock thermal and mechanical properties and update the data bases. Continue the development of design methods and computer codes to be employed in the design of the ESF and the Repository. Perform preliminary evaluation of mining methods for the repository accesses.	Emphasis will be on the development of a final seismic design basis for the ACD. Continue to conduct laboratory test of rock thermal and mechanical properties and update the data bases. Initiate testing of properties of crushed tuff and begin repository sealing conceptual design. Begin testing of emplacement and retrieval equipment components. Begin development of a Repository Decommissioning Concept Plan for ACD and conduct supporting studies.	Procure A/E services and begin repository ACD, including trade-off studies. Development of a repository operations plan will begin for the ACD. Complete waste emplacement mode confirmation studies. Begin construction phase testing in the ESF. Start testing of prototype drill boring machine. Complete final surface facility analysis for the ACD. Conduct laboratory testing of seal materials. Update decommissioning concept development report and carry out seismic design basis analysis. With the beginning of the sinking of ES-1, the evaluation of mining methods will begin, the shaft convergence experiment and excavation effects monitoring will begin.

III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Repository (Cont'd)	Continued management controls and procedures for the design of the repository system and quality assurance requirements relative to site preparation, surface facilities, and underground systems compatible with operation of the facility and that it can be decommissioned and meet performance assessment requirements over the long term.	Continue management controls and procedures for the design of the repository system, and strict quality assurance requirements to assure that the site preparation, surface facilities, and underground systems are compatible with near term facility operation and maintenance and that it can be decommissioned and meet performance assessment requirements over the long term.	Continue management controls and procedures for the design of the repository system and quality assurance requirements assuring that the site preparation, surface facilities, and underground systems are compatable with the operation and maintenance of the facility in the near term and can be decommissioned and meet performance assessment requirements over the long term.	Continue management controls and procedures for the design of the repository system and quality assurance requirements to assure that the site preparation, surface facilities, and underground systems are compatible with near term facility operation and maintenance and can be decommissioned and meet performance assessment requirements over the long term.	Continue management controls and procedures for the design of the repository system and quality assurance requirements to assure that the site preparation, surface facilities, and underground systems are compatible with near term facility operation and maintenance and can be decommissioned and meet performance assessment requirements over the long term.
	$ 15,145	$ 12,227	$ 10,050	$ 62,541	$ 97,800
Regulatory/Institutional	In the Environmental Compliance area continued review of evolving YM activities to ensure compliance with regulatory requirements. Revised the Environmental Regulatory Compliance Plan (ERCP) and the Environmental Monitoring and Mitigation Plan (EMMP) based upon the State of Nevada SCP/DB comments. Continued efforts to obtain environmental permits for site characterization activities, and	Complete all remaining permit applications for site characterization activities. Initiate preparation of the biannual reports to confirm compliance with permit and/or regulatory requirements. Prepare two semiannual EMMP progress reports covering site activities. Continue environmental monitoring in areas of terrestrial ecosystems, archaeological, air quality, meteorology, and Native American			

III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Regulatory/Institutional (Cont'd)	developed an Environmental Regulatory Compliance Tracking System. Prepared an Environmental Program Overview document. Identified and documented reclamation requirements. In the environmental area, released five Environmental Field Activity Plans (EFAPs) to the State of Nevada and began the monitoring activities described therein. Continued meteorological monitoring. Installed air quality monitoring equipment and began acquiring data. Drafted EFAPs for Water Resources and Soils. Prepared a Reclamation Feasibility Plan (RFP) and Reclamation Implementation Plan (RIP). Implemented the Radiological monitoring program and conducted general health physics and radiological engineering seminars. In the transportation area, finalized and published the following: Section 175 Transportation Analysis; Nevada Highway Routing Report; Rail Access Report; and	interactions. Begin monitoring of gaseous criteria pollutants. Implement the water resources monitoring and soils studies programs. Continue radiological monitoring data collection and analysis. Initiate reclamation-related field activities. Update the Socioeconomic Program Plan, continue support to the radiological monitoring program, develop small-area economic and demographic modeling methods and prepare an annual report. Continue support for payments-equal-to-taxes program and efforts to review grant requests from the state and local governments. Contribute to the impact mitigation process. Develop responses to the NRC's SCA and implement a change control system for site characterization activities. Complete two SCP Progress Reports. Complete SCP comment response documents. Develop materials and participate in meetings with the NRC, NWTRB,			

III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Regulatory/Institutional (Cont'd)	Transportation Studies Plan. Completed a review of highway access routes to the YM site. Developed recommendations for selection of preferred site access routes. Completed the evaluation of site overflights and the evaluation of data and models of transportation risk analysis. In the Socioeconomic area, completed and published the Section 175 report. Revised the Socioeconomic Monitoring Program (SMP) based upon the conclusions of the Section 175 Report. Generated two seminannul SMP progress reports. Developed the Socioeconomic data base for the radiological monitoring program. Appraised the value of the YM site for the Payments-Equal-to-Taxes Program and estimated Project amounts. Issued SCP Semi-annual Progress Reports. Approved 8 SCP Study Plans. Continued to develop the Technical Support Document Management Plan. Developed materials and participated in	ACNW and others as required. Review and approve study plans for ongoing and high-priority Study Plans. Continue support for Technical Support Document planning and development of TRIMS. Open a YM Information Office in Las Vegas, NV, and continue operation of the Beatty, NV, office. Hold semiannual project update meetings, public presentations, and exhibit showings as the opportunity arises. Contribute to other project interactions with the State of Nevada and affected local governments. Begin feasibility analysis, conceptual design, and cost analysis for an alternative rail access route. Facilitate participation from local governments in rail access.			

III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Regulatory/Institutional (Cont'd)	meetings with the NRC, NWTRB, ACNW and others as required. Continued support for Technical Support Document planning and development of TRIMS. In the communication and liaison area, continued operation of the YM Information Office in Beatty, NV developed plans for a similar office in Las Vegas, NV. Continued public information document preparation, Project update meetings, presentations and formal public hearings. Contributed to other Project interactions with the State of Nevada and affected local governments. Defined scope of work for feasibility analysis, conceptual design, and cost analysis for an alternative rail access route. Facilitated participation from local governments in rail access development.				

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III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Regulatory/Institutional (Cont'd)			Continue to review project activities to ensure regulatory requirements are met. Prepare documentation for the biannual report prepared to confirm compliance with permit and/or regulatory requirements. Prepare two Environmental Monitoring and Mitigation Progress Reports.	Prepare documentation for the biannual report for compliance with permit and/or regulatory requirements. Prepare two semiannual Environmental Monitoring and Mitigation Progress reports. Track reclamation activities. Prepare the EIS Management Plan, support EIS scoping meetings and drafting of the EIS Implementation Plan.	Identify and document Federal, State, and local regulations that may apply to a repository at Yucca Mountain in a draft Environmental Regulatory Compliance Plan. Perform surveillance of site activities and prepare biannual reports for compliance with permit and/or regulatory requirements. Prepare the semiannual Environmental Monitoring and Mitigation Progress reports.
			Continue Environmental monitoring and compile data reports. Continue reclamation-related data gathering and planning.	Continue Environmental monitoring in all technical areas. Begin post-activity surveys for reclamation purposes.	Continue Environmental monitoring in all areas. Initiate preparation of draft EIS materials.
			Update the Socioeconomic Program Plan, continue monitoring activities and prepare two semiannual progress reports. Continue development and testing of the small-area economic and demographic modeling methods and prepare an annual report. Continue support for the Payments-Equal-To-Taxes	Update the Socioeconomic Program Plan, continue monitoring activities and prepare two semiannual progress reports. Maintain the socioeconomic data base for the radiological monitoring program, refine the small-area economic and demographic modeling methods and prepare an annual report. Continue	Update the Socioeconomic Program Plan for the YM. Continue Socioeconomic Monitoring Program activities and prepare two semiannual progress reports. Update the socioeconomic data base, prepare revised economic and demographic projections, and prepare an annual report for the

III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Regulatory/Institutional (Cont'd)			program and efforts to review grant requests from the State and local governments. Contribute to the EIS scoping and planning processes. Complete the economic water resource assessment of the YM area. Contribute to the impact mitigation process.	support for the Payments-Equal-To-Taxes program and efforts to review grant requests from the State and local governments. Initiate preparation of the socioeconomic input for the EIS.	radiological monitoring program (RMP) study area. Continue support for the Payments-Equal-to-Taxes program and efforts to review grant requests from the State and local governments. Complete the socioeconomic topical report and DEIS input. Continue efforts to support the impact mitigation process.
			Continue to maintain change control for site characterization activites. Complete SCP Progress Reports. Develop materials and participate in meetings with the NRC, NWTRB, ACNW, and others as required. Review and approve Study Plans as required including revisions to previously approved Study Plans. Continue support for Technical support Document planning and implementation of TRIMS and monitor progress in all programs. Continue to provide information to the public at the YM Information Offices, hold two semiannual Project update meetings, and give	Continue to maintain change control for site characterizaion activities. Complete SCP Progress Reports. Develop materials and participate in meetings with the NRC, NWTRB, ACNW, and others as required. Review and approve Study Plans as required including revisions to previously approved Study Plans. Continue support for Technical Support Document planning and implementation of TRIMS and monitor progress in all programs. Continue to operate the Information Offices, hold two semiannual Project update meetings, and give presentations and	Continue to maintain change control for site characterization activities. Complete SCP Progress Reports. Develop materials and participate in meetings with the NRC, NWTRB, ACNW, and others as required. Review and approve Study Plans as required including revisions to previously approved Study Plans. Continue support for Technical Support Document planning and implementation of TRIMS and monitor progress in all programs. Conduct institutional and public information activities. Provide support for the development of the DEIS and interactions with

III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Regulatory, Institutional (Cont'd)			public presentations and exhibit showings as opportunities or the need occur. Contribute to other Project interactions with the State of Nevada and affected local governments. Continue feasibility analysis, conceptual design, and cost analysis for an alternative rail access route. Facilitate participation from local governments in rail access development.	exhibits showings as opportunities or the need occur. Contribute to other Project interactions with the State of Nevada and affected local governments. Complete feasibility analysis, conceptual design, and cost analysis for an alternative rail access route. Facilitate participation from local governments in rail access development.	the State and affected local governments. Continue to operate the information offices, hold two semiannual Project update meetings, and give public presentations and exhibits. Facilitate participation from local governments in rail access development. Complete EIS Analysis Plan for transportation. Complete plan for EIS field activities. Complete and analysis of USAF Overflights of the Yucca Mountain Site.
	$ 20,368	$ 21,562	$ 20,840	$ 31,277	$ 34,840
Exploratory Shaft	Initiated Title II design packages development for the Exploratory Shaft Facility (ESF) surface and subsurface. Title II design activities were initiated for the site preparation activities, buildings, power systems, communications system, ES-1 and ES-2 collars, hoists/headframes	Continue the Alternative Strategies Studies which will focus on answering the questions and concerns of the State, the NRC, and the NWTRB. Complete the first design package consisting of the initial site preparation, which access includes the road areas for topsoil	Resume ES final design packages development for the Exploratory Shaft Facility (ESF) surface and subsurface. Title II design activities include the site preparation activities, buildings, power system, communications system, shaft, hoists/headframes shafts/liners,	Complete Title II design for the surface facilities, surface utility, and shaft excavation and lining packages. The Title II design activities will be completed for G-4 pad and access road, water tanks, explosive storage, substation, N-Road, warehouse and shop, and sewage systems. Conduct	Complete the IDS design. Complete Title II design for underground excavations and utilities. Complete construction of surface facilities and utilities. Issue Title II Design report. Begin ESF shaft sinking.

III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Exploratory Shaft (Cont'd)	shafts/liners, Main Test Level (MTL) subsurface, and ES-1 and ES-2 internals and conveyances. Issued the ESF Subsystem Design Requirements Document and implemented a design control process. Initiate the Alternative Strategies Study which focus on answering the questions and concerns of the NRC, NWTAB, and State. Continued to refine the ESF cost and schedule tracking system to encompass all aspects of ESF activity.	and borrow. This package will be utilized as a means to qualify the design control process with the NRC. Start procurement of a project architect/engineer.	ramps/liners. Main Test Level (MTL) subsurface, and shaft/ramp internals and conveyances. The Alternative Strategies Studies will be completed with a report issued to HQ.	technical design reviews of ESF design. Begin site prepartion activities and complete key long lead equipment purchases. Title III activities will begin. Mine safety training and field quality control program will be initiated with the start of site preparation.	
	$ 26,132	$ 12,800	$ 15,000	$ 30,000	$ 60,510
Test Facilities	In the Test Facilities area, Continued G-Tunnel activities to develop methods for field experiments and mining techniques in welded tuff. Conducted tours at Climax facility to educate the public about the repository and waste isolation concepts. International activities in support of the First Repository Program continued.	Perform routine facility M&O services and participant support at reduced levels. Complete area 25 A/E building including area 25 waterline upgrade. Complete Title II Radio Network design. Continue FOC support on an as needed basis. Complete field management plans and associated implementing procedures. International activities in support	Continue design/renovation/construction of essential Area 25 facilities and utilities. Provide area 25 vehicle support. Continue routinge facility M&O services and participant support at reduced levels. Activate a field operations center. International activities in support of the First Repository Program continued.	Complete many of essential Area 25 renovations and construction starts. Establish dedicated entry control point to Area 25. Design and construct new bypass road to ESF. Establish landfill and fire protection facilities to satisfy environmental, safety, and health requirements. Continue routine facility M&O services and	Continue completion of construction starts. Complet Phase II telecommunications system design. Start advanced procurement of Phase II telecommunications system. Design and start construction of additional warehousing. Establish Area 25 feeding facilities. Upgrade Area 25 underground communications cabling. Continue security

III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Test Facilities (Cont'd)		of the First Repository Program continued.		participant support. Expand field support operations to meet increasing technical requirements. Start design of Phase II telecommunications network. expand vehicle and other logistics support. International activities in support of the First Repository continued.	services. Continue routine facility M&O services and participant support. Continue field operations support. International activities in support of the First Repository Program continued.
	$ 10,782	$ 16,235	$ 12,400	$ 26,400	$ 21,400
Project Management	Provided project management and control functions including Project planning, budgeting, financial analysis, cost and schedule control, progress report, and training. Provided administrative services including legal, procurement, subcontract administration, facilities, equipment, communications and security, publications and graphics, library operations, computer support, and records management.	Continue to provide project management, control, and administrative services as outlined for FY 1989, including a modest increase in project cost and schedule control system support.	Provide project management control, and administrative services as outlined in FY 1989.	Continue to provide project management control, and administrative services as outlined for FY 1989. Modest growth is expected as the size of the project increases in this year. Increase the quality assurance program to satisfying DOE and NRC requirements to include increased quality control verification and acceptance activities in support of site exploration and construction effort. Continue training individuals responsible for quality affecting work, and overview conduct of quality	Continue to provide project management, control, and administrative services as outlined for FY 1989. Modest growth is expectd as the size of the Project increases this year. Increase the Quality Assurance Program to satisfy DOE and NRC requirements to include increased quality control verification and acceptance activities in support of site exploration and construction efforts. Continue training individuals responsible for quality affecting work, and overview conduct of quality

III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Project Management (Cont'd)				affecting work through audits and surveillance. Review project deliverable to assure QA requirements are satisfied. Work closely with technical line management in monitoring the program and providing an independent overview of project goal accomplishments. A signifigant increase in quality assurance/quality control activities is expected as site characterization field activities begin in FY 1992.	affecting activities through audit and surveillances. Review Project deliverables to assure QA requirements are satisfied. Work closely with technical line management in monitoring the program and providing an independent overview of Project goal accomplishments. A significant increase in quality assurance/quality control support is expected as the exploratory shaft construction begins.
	Maintained the quality assurance program to satisfy DOE and NRC requirements. Continued training individuals responsible for quality affecting work. Provided overview of quality affecting work through audits and surveillance. Continued review of project deliverables to assure QA requirements were satisfied, and worked closely with technical line management to implement the program, and provide an	Maintain the quality assurance program to satisfy DOE and NRC requirements. Continue training individuals responsible for quality affecting work. Overview quality affecting work through audits and surveillance. Continue review of project deliverables to assure QA requirements are satisfied and work closely with technical line management to monitor the program, and provide an independent overview of	Maintain the quality assurance program to satisfy DOE and NRC requirements. Continued training individuals responsible for quality affecting work. Overview quality affecting work through audits and surveillance. Continue review of project deliverables to assure QA requirements are satisfied. Work closely with technical line management to monitor the program, and to provide an independent overview of		

III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Project Management (Cont'd)	independent overview of the accomplishment of project goals.	the accomplishment of project goals.	the accomplishment of project goals.		
	$ 41,853	$ 28,889	$ 46,445	$ 59,225	$ 73,225
Financial and Technical Assistance	Continued to offer to enter into Benefits Agreement negotiations with the State of Nevada. Provided for financial assistance requests from potential volunteer states.	Continue payments equal to taxes in accordance with the NWPAA. No funds are requested for the Benefits Agreements Program. If an agreement is reached, an FY 1990 supplemental budget request will be submitted to provide the required funding to carryout this program as described in P.L. 100-203.	Continue payments equal to taxes in accordance with the NWPAA. In the event that no agreement is reached; continue to offer/negotiate benefit payments with the State of Nevada. However, no funds are requested for the Benefits Agreement Program. Make impact assistance payments to Nevada and local jurisdictions.	Continue payments equal to taxes in accordance with the NWPAA. Continue the Benefits Agreement Program providing agreement is reached with the State of Nevada. Provide for financial assistance requests from potential volunteer states.	Continue payments equal to taxes in accordance with the NWPAA. Continue the Benefits Agreement Program providing agreement is reached with the State of Nevada. Provide for financial assistance requests from potential volunteer states.
	Continued Grants to State of Nevada in accordance with NWPAA and the guidance provided by the Congress in the FY 1989 Appropriations Act.	Continue Grants to State of Nevada in accordance with NWPAA and the guidance provided by the Congress in the FY 1990 Appropriations Act.	Continue Grants to State of Nevada in accordance with NWPAA and the guidance provided by the Congress in the FY 1991 Appropriations Act.	Continue Grants to State of Nevada in accordance with NWPAA and the guidance provided by the Congress in the FY 1992 Appropriations Act.	Continue Grants to State of Nevada in accordance with NWPAA and the guidance provided by the Congress in the FY 1993 Appropriations Act.
	Continued grants to local governments in accordance with NWPAA and the guidance provided by the Congress in the FY 1989 Appropriations Act.	Continue grants to local governments in accordance with NWPAA and the guidance provided by the Congress in the FY 1990 Appropriations Act.	Continue grants to local governments in accordance with NWPAA and the guidance provided by the Congress in the FY 1991 Appropriations Act.	Continue grants to local governments in accordance with NWPAA and the guidance provided by the Congress in the FY 1992 Appropriations Act.	Continue grants to local governments in accordance with NWPAA and the guidance provided by the Congress in the FY 1993 Appropriations Act.
	$ 27,009	$ 17,600	$ 17,600	$ 55,648	$ 60,600

III. First Repository (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Closeout Sites	Completed reclamation at salt sites. Continued to store cores from salt and basalt projects. Continued borehole reclamation at basalt site. Complete Near Surface Test Facility reclamation except revegetation and complete basalt ESF reclamation. Continued hot-cell decontamination and waste material disposal and 2101-M hazardous waste pond reclamations. Continued records management activities at salt and basalt sites. Negotiated termination settlements.	Continue to store cores from salt and basalt sites. Complete borehole reclamation at basalt. Complete basalt RSTF revegetation. Complete NWF-related hot-cell decontamination and waste material disposal and 2101-M waste pond reclamations. Complete records management activities. Negotiate termination settlements. All activities will be funded with prior year uncosted obligations. Closeout basalt grantees. Continue property disposition for basalt closeout salt leases.	Continue to store cores from salt and basalt sites. All activities will be funded with prior year uncosted obligations. Complete negotiation of termination settlements. Continue record storage. Complete remedial revegetation at Near Surface Test Facility and basalt ESF if necessary.	Transfer or dispose of salt and basalt cores. All activities will be funded with prior year uncosted obligations. Continue record storage.	Transfer or dispose of salt and basalt cores. All activities will be funded with prior year uncosted obligations. Continue record storage.
	$ 0	$ 0	$ 0	$ 0	$ 0
First Repository	$ 223,700	$ 176,058	$ 193,220	$ 403,880	$ 513,618

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
NUCLEAR WASTE FUND
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR WASTE FUND

I. Preface: Monitored Retrievable Storage

Since the MRS Review Commission report has been submitted to the Congress, proceed with activities necessary to site, design, construct, obtain a license from the Nuclear Regulatory Commission (NRC), and operate a facility to perform spent nuclear fuel receipt, handling and storage, as necessary, prior to emplacement in a geologic repository. In order to ensure that all aspects of the work are conducted effectively and efficiently and that NRC regulatory requirements for licensing are met, a comprehensive quality assurance program will be developed and implemented.

II. A. Summary Table: Monitored Retrievable Storage

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change	FY 1992 Request	FY 1993 Request
Design and Engineering Studies	$ 4,250	$ 0	$ 1,800	>999	$ 24,062	$ 16,788
Siting	900	1,500	2,300	+ 53	23,599	5,559
Regulatory	1,600	0	300	>999	1,443	2,004
Licensing	1,000	0	1,000	>999	4,225	1,952
Environmental	500	0	800	>999	3,091	4,110
Project Management	1,750	1,500	1,900	+ 27	5,616	5,035
Systems Support	5,000	0	1,900	>999	7,214	10,275
Total, Monitored Retrievable Storage	$ 15,000	$ 3,000	$ 10,000	+233	$ 69,250	$ 45,723

11. B. Major Laboratory and Facility Funding:

	FY 1989	FY 1990	FY 1991	% Change	FY 1992	FY 1993
Battelle	900	--	--	0%	--	--
Oak Ridge Operations Office	20	--	--	0%	--	--
Pacific Northwest Laboratory	79	--	--	0%	--	--
Richland Operations Office	386	--	--	0%	--	--

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Monitored Retrievable Storage					
Design and Engineering Studies	Performed design scoping studies including selection of spent fuel storage approach, to allow proceeding into conceptual design. Continued engineering evaluations and tradeoff studies. Developed comprehensive engineering program plans.	Continue the engineering studies applicable to the MRS. Develop the conceptual design criteria, design performance requirements, and a systems study plan. Initiate conceptual design for a generic site. Complete plans for high priority design feature tests. Develop physical site design criteria for use in MRS siting and for the Nuclear Waste Negotiator. This activity will utilize $1,440 of prior year funds.	Complete the facility functions technical baseline. Complete the conceptual design and planning for Title I design. Perform design reviews and technical support studies. Initiate design feature tests and planning for prototypic systems tests.	Maintain the technical baseline. Complete Title I trade-off studies and systems optimization studies. Complete Title I design. Complete the design feature tests and planning for prototypic system tests.	Initiate Title II design. Initiate procurement of equipment for prototypic systems tests. Collect and incorporate site data into the design for each (one or more) site under consideration.
	$ 4,250	$ 0	$ 1,800	$ 24,862	$ 16,788
Siting	Began development of siting plan.	Implement siting activities. Finalize siting plan; complete general information reports; begin compilation and review of existing data for identification of potentially suitable sites; develop public information materials; oversight of grants requested by an affected State or Indian Tribe; support	Continue siting activities; initiate preparation of draft EA; identify preferred sites for draft EA; continue development and provision of public information materials; oversight of grants; support for public/institutional involvement; support external review; commence geotechnical field activities and	Complete identification of preferred sites for the draft EA. Develop public information materials; oversight of grants; support public involvement; support external review; develop transportation and environmental data on alternative sites; continue geotechnical, environmental, and socioeconomic field activities; continue	Prepare and issue draft EA; begin public hearings; begin response to comments on draft EA; provide information materials; oversight of grants; and support public/institutional involvement; support external review; continue geotechnical, environmental, and socioeconomic field activities; continue

III. Monitored Retrievable Storage (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Siting (Cont'd)		public/institutional involvement; and support assessment of access routes and system infrastucture; commence preliminary environmental and socioeconomic field activities. The siting activities will utilize $1,840 of prior year funds.	engineering analyses; continue socioeconomic and environmental field activities.	engineering analyses.	engineering analyses.
	$ 900	$ 1,500	$ 2,300	$ 23,599	$ 5,559
Regulatory	Continued in-depth engineering analysis to define role and function of an MRS. Began detailed planning for regulatory compliance (NEPA compliance, State and local permitting, RCRA/CERCLA compliance, etc.).	Begin developing an MRS Regulatory Compliance Plan. Assess the modeling and data needs for an MRS Safety Analysis Report (SAR). This activity will utilize $240 of prior year funds.	Complete the MRS Regulatory Compliance Plan. Continue to assess the MRS Safety Analysis Report (SAR) modeling and data need and develop an MRS SAR Management Plan. Perform Safety/Risk Assessment of the MRS design (Title I).	Update the MRS Regulatory Compliance Plan. Assess the Quality Assurance requirements for the SAR and compliance Plan.	Continue Safety/Risk Assessment of the MRS design and begin certification of the MRS Safety assessment models. Develop an SAR annotated outline and begin the first draft of the SAR. Assess the MRS site survey data and information.
	$ 1,600	$ 0	$ 300	$ 1,443	$ 2,006

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III. Monitored Retrievable Storage (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Licensing	Coordinated review and interpretation of licensing-related statutes and regulations.	Continue licensing planning strategy. Review licensing issues with respect to MRS siting. Negotiate procedural agreement with NRC for pre-licensing interactions. Develop a 10CFR72 Compliance Document and a Licensing Plan. This activity will utilize $800 of prior year funds.	Refine licensing strategy working with States and Tribes. Finalize planning. Continue NRC interactions. Continue to resolve site-related MRS licensing issues through submission of topical reports. Perform Safety/Risk Assessment of the MRS design (Title I).	Update the MRS Regulatory Compliance Plan. Assess the Quality Assurance requirements for the SAR and compliance Plan. Continue review of design and siting information.	Continue review, refinement and coordination of MRS licensing strategy and issues. Continue submission of topical reports to NRC. Continue review of design and siting information. Begin preparation of the license application.
	$ 1,000	$ 0	$ 1,000	$ 4,225	$ 1,952
Environmental	Initiated environmental assessment (EA) planning activities.	Begin collecting available information for a site Environmental Assessment (EA). This activity will utilize $640 of prior year funds.	Continue acquisition and analysis of information for the EA to support site selection. Hold public hearings in the vicinity of the proposed sites.	Complete review and production of the EA. Submit EA to Congress at time of site selection.	After site selection, initiate scoping process for the Environmental Impact Statement (EIS). Begin preparation of draft EIS (DEIS) to comply with NEPA requirements.
	$ 500	$ 0	$ 800	$ 3,091	$ 4,110

III. Monitored Retrievable Storage (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Project Management	Initiated Program Management activities. Developed MRS Project Management System, and systems engineering and configuration management program. Developed and implemented a comprehensive quality assurance program that meets DOE and NRC requirements for future licensing. All quality-related activities were planned, scheduled and documented to provide objective evidence of compliance and procedural adequacy.	Continue to provide Program Management activities. Develop MRS Project Management System and configuration management program. Begin preparation of life cycle program plan. Begin documentation and reporting as a Major System Acquisition. Maintain a comprehensive quality assurance program that meets DOE and NRC requirements for future licensing. The MRS activities will utilize $1,520 of prior year funds.	Continue to provide Program Management activities including planning, cost/schedule controls, subcontractor procurement, records management, and configuration management. Maintain a comprehensive quality assurance program.	Continue to provide Program Management and quality assurance activities as in FY 1991.	Continue to provide Program Management and quality assurance activities as in FY 1992. Emphasis will be on management of Title I design activities.
	$ 1,750	$ 1,500	$ 1,900	$ 5,616	$ 5,035
Systems Support	Funds appropriated for this activity were carried over to FY 1990 due to the extension of due date for submittal of the MRS Review Commission Report to Congress.	Consistent with NWPA Amendments, provide for grants to States, Indian Tribes, or units of local government to assess the feasibility of siting an MRS in their jurisdictions. No funds are requested for benefits payments. If a benefits agreement is negotiated, a supplemental budget request will be submitted to provide the required funding. This activity will	Consistent with NWPA Amendments, provide for grants to States, Indian Tribes, or units of local government to assess the feasibility of siting an MRS in their jurisdictions. No funds are requested for benefits payments.	Consistent with NWPA Amendments, provide for grants to States, Indian Tribes, or units of local government for assessing the feasibility of siting an MRS in their jurisdictions. No funds are requested for benefits payments.	Consistent with NWPA Amendments, provide for grants to States, Indian Tribes, or units of local government for assessing the feasibility of siting an MRS in their jurisdictions. No funds are requested for benefits payments.

III. Monitored Retrievable Storage (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Systems Support (Cont'd)		utilize $1,520 of prior year funds.			
	$ 5,000	$ 0	$ 1,900	$ 7,214	$ 10,275
Monitored Retrievable Storage	$ 15,000	$ 3,000	$ 10,000	$ 69,250	$ 45,723

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
NUCLEAR WASTE FUND
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR WASTE FUND

I. Preface: Transportation, Systems Integration, and Engineering Development

Transportation

The purpose of the Transportation program is to assure that a safe, environmentally acceptable, and cost-effective transportation system is in place when needed to support facility operations utilizing the private sector to the fullest extent possible; Provide for the design, development, certification, and testing of necessary transportation equipment and services required for operation; Identify and resolve institutional issues; and, develop analytical processes and transportation information data bases to support overall program requirements. (e.g., Environment Assessment and Environmental Impact Statement support, risk assessment, interface information, cost information, etc.); Provide for the operational aspects of the shipment of spent fuel and high-level wastes to storage and/or final disposal facilities.

System Integration

The objective of Systems Integration is to ensure that the Office of Civilian Radioactive Waste Management (OCRWM) components are integrated into a waste management system that is safe, efficient, reliable, cost effective, and on schedule. The approach to accomplish this objective is to: Identify and baseline technical requirements of the total system; Maintain current description of system, components, and interfaces that meet requirements; Enhance communication among parties responsible for individual system components and functions; Develop and maintain capability to fully assess alternative concepts; Conduct system studies and recommend improvements; and Support development of equipment and processes having potential to improve the system.

Engineering Development

The Engineering Development program develops and demonstrates crosscutting technologies required by OCRWM, such as: A process to consolidate spent nuclear fuel assemblies on a production line basis, adequate to meet the annual throughput requirements of a Monitored Retrievable Storage (MRS) facility or a geological repository and the development of alternative dry storage technologies for spent nuclear fuel. This task shall include demonstration of the equipment through the consolidation of actual spent fuel assemblies, if a decision is made that the consolidation is required by the program; Technologies to implement automated remote handling techniques in the OCRWM Program; Technologies and process required to allow the OCRWM Program to comply with international nuclear material safeguards requirements; Processes to allow the use of value engineering concepts in the management of optimization of the OCRWM Program; Processes and equipment to be used in the decontamination and decommissioning of OCRWM Program facilities and equipment; Processes for use in implementing Quality Assurance requirements in the OCRWM Program.

II. A. Summary Table: Transportation, Systems Integration, and Engineering Development

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change	FY 1992 Request	FY 1993 Request
Transportation						
Cask Systems Development	$ 14,530	$ 11,082	$ 12,260	+ 11	$ 12,525	$ 21,405
Institutional	2,555	2,190	2,360	+ 7	4,950	5,162
Systems Analysis	2,326	1,260	1,475	+ 17	3,722	3,999
Program Management	1,980	1,000	1,175	+ 18	2,164	2,465
Operations	271	140	350	+150	286	609
Support Systems Development	2,132	2,078	2,310	+ 11	5,640	5,744
Subtotal, Transportation	$ 26,000	$ 17,750	$ 19,910	+ 12	$ 29,221	$ 39,584
Systems Integration						
Systems Requirements & Description	$ 1,378	$ 2,047	$ 3,847	+ 49	$ 2,149	$ 2,116
Systems Analysis Capabilities	969	549	1,049	+ 88	2,064	2,569
Systems Engineering Studies	1,328	835	1,705	+104	6,648	6,679
Special Studies	630	144	444	+205	3,667	3,596
Program Management	695	285	783	+266	1,438	1,489
Subtotal, Systems Integration	$ 5,000	$ 3,800	$ 6,970	+ 83	$ 15,976	$ 16,449
Engineering Development						
Prototypic Consolidation Development Program	$ 10,965	$ 450	$ 3,400	+656	$ 12,512	$ 1,677
Long Term Storage & Monitoring	0	0	0	0	0	0
Gun Fuel Bearing Components	0	0	0	0	0	1,027
Concrete Cask Testing Project	1,035	0	0	0	0	0
Nuclear Fuel Services (NFS)	0	0	0	0	0	0
Subtotal, Engineering Development	$ 12,000	$ 450	$ 3,400	+656	$ 12,512	$ 2,704
Total, Transportation, Systems Integration, and Engineering Development	$ 43,000	$ 22,000	$ 30,280	+ 38	$ 57,709	$ 58,738

II. B. Major Laboratory and Facility Funding:

	FY 1989	FY 1990	FY 1991	% Change	FY 1992	FY 1993
Argonne National Laboratory (ANL)	360	260	357	37%	489	758
Chicago Operations Office	1,278	707	972	37%	1,875	2,065
Battelle	3,891	2,058	2,831	38%	5,463	6,017
Idaho Operations Office	14,469	4,920	8,268	68%	10,255	11,866
Idaho National Engineering Laboratory	5,795	3,480	3,280	0%	6,176	6,803
Oak Ridge Operation Office	56	0	0	0%	0	0
Oak Ridge National Laboratory	5,912	4,345	5,978	38%	11,537	12,706
Pacific Northwest Laboratory	2,062	2,055	2,880	38%	5,463	5,669
Richland Operations	215	0	0		0	0
Sandia National Laboratory (SNL)	3,457	4,095	5,579	38%	10,767	11,860
Los Alamos National Laboratory	50	0	0	0%	0	0

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Transportation, Systems Integration, and Engineering Development					
Transportation					
Cask Systems Development	Continued all preliminary design work on Legal Weight Truck and Rail/Barge Casks. Conducted engineering tests to support preliminary design. Provided QA support to include QA plans, document review, source inspections and contractor surveillance. Continued technical issue resolution including burnup credit, storage/transport cask and source term. Evaluated cask contractor solutions to benchmarking problems and initiated benchmark experiments. Continued to develop material and component technology to support cask designs. Continued to develop automated cask handling technology. Continued test planning support and instrumentation evaluations for use in design verification testing. Participated in design reviews.	Complete preliminary design and commence final activities on Legal Weight Truck and Rail/Barge Casks and conduct engineering, drop and design verification tests. Commenced final design activities. Evaluate transport/storage technology options. Continue to provide QA support to include QA plans, document review, source inspections and contractor surveillance. Continue to resolve technical issues. Complete benchmark experiments. Continue to develop material and component technology to support cask designs. Continue automated handling technology and issue topical reports. Initiate evaluation of new transporter technology required as a result of from-reactor cask design progress. Continue test planning support and issue	Issue final design reports on Legal Weight Truck Casks and continue to conduct engineering, drop and design verification tests as appropriate. Submit Safety Analysis Reports for Packaging (SARP) to NRC for certification of Legal Weight Truck. Initiate development of selected transport/storage technology. Continue to provide QA support to include QA plans, document review, source inspections and contractor surveillance. Continue to resolve technical issues. Continue to develop material and component technology to support cask designs. Continue to develop automated handling and new transport equipment technology. Continue test planning support. Continue to provide instrumentation equipment, monitor testing and review data for cask design	Commence preliminary design and conduct of engineering tests on Overweight Truck Casks if a decision is made to pursue overweight truck casks. Prepare specifications and begin development of an RFP for Specialty Casks. Continue to support NRC certification process on Legal Weight Truck Casks. Issue final design reports on legal weight truck casks, and continue to conduct engineering, drop and design verification tests as appropriate. Submit Safety Analysis Report for packaging (SARP) to NRC for certification of Rail/Barge casks. Continue development of selected transport/storage technologies. Initiate studies for development of Specialty Casks. Continue to provide QA support to include QA plans, document review, source inspections and	Complete support for NRC certification of Legal Weight Truck Casks. Continue to support NRC certification process on Rail/Barge casks. Continue development of selected transport/storage technologies. Initiate studies for development of Defense High-Level Waste Cask specifications. Continue to address technical issues requiring resolution. Continue to develop material and component technology to support cask designs. Continue to develop automated handling and new transport equipment technology. Continue test planning support. Continue monitoring verification activities. Support design reviews. Continue to provide QA support to include QA plans, document review, source inspections and contractor

III. Transportation, Systems Integration, and Engineering Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Cask Systems Development (Cont'd)		instrumentation evaluation report. Enhance development of an equipment pool to assist monitoring verification tasks. Monitor verification testing. Support design reviews. Prior year unobligated funds of $5,650 will also be used to cover these activities.	verification testing. Support design reviews.	Contractor surveillance. Continue to address technical issues requiring resolution. Continue to develop material and component technology to support cask designs. Continue to develop automated handling and new transport equipment technology. Continue test planning support. Continue monitoring verification activities. Support design reviews.	surveillance. Complete preliminary design and engineering tests and commence final design on Overweight Truck Casks, if appropriate. Issue RFP for Specialty Casks. Initiate verification testing on Overweight Truck Cask designs if appropriate.
	$ 14,530	$ 11,082	$ 12,260	$ 12,523	$ 21,605
Institutional	Continued cooperative agreements with various national and regional groups. Continued institutional planning and issued resolution activities with State, tribal and industry transportation representatives. Supported TCG meetings and technical workshops. Continued to distribute public information materials. Initiated pilot study to finalize vehicle inspection procedures.	Continue cooperative agreements with various national and regional groups. Initiate RE regional group. Continue institutional planning and issue resolution activities with State, Tribal and industry transportation reps., including vehicle inspection pilot study. Support TCG meetings and technical workshops. Continue to distribute public information materials. Develop policy paper on feasibility of uniform permits for overweight	Continue cooperative agreements with various national and regional groups. Continue institutional planning and issue resolution activities with State, Tribal and industry transportation reps. Support TCG meetings and technical workshops. Continue to distribute public information materials. Continue vehicle inspection pilot study. Support EIS planning activities.	Initiate implementation of 180(c) strategy. Continue cooperative agreements with various national, regional, & local groups. Select National emergency group to support 180(c) planning. Continue and expand institutional planning and issue resolution activities with State, Tribal and industry transportation representatives. Continue vehicle inspection pilot study. Support TCG meetings and technical workshops. Initiate education and training	Continue implementation of 180(c) strategy. Continue cooperative agreements with various national, regional, & local groups. Continue institutional planning and issue resolution activities with State, Tribal and industry transportation representatives. Continue vehicle inspection pilot study. Support TCG meetings and technical workshops. Continue education and training program development. Continue to distribute public information

III. Transportation, Systems Integration, and Engineering Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Institutional (Cont'd)		truck. Develop implementation strategy for Section 180(c).		program including evaluation efforts. Continue to distribute public information materials.	materials.
	$ 2,555	$ 2,190	$ 2,340	$ 4,958	$ 5,162
Systems Analysis	Modified and updated data bases supporting various routing, cask performance, and cost models. Initiated and completed TRICAR documentation. Maintained reference transportation system to provide baseline tradeoff assumptions. Supported cask design through life-cycle cost (LCC) analyses. Continued specified transportation systems support analyses to support identified program decisions. Initiated Near-Site Transportation Infrastructure Study (NSTI) to assess reactor-specific transportation needs.	Continue updating codes for transportation systems optimization, risk assessment, etc. Finalize modification of RADTRAN code for OCRWM. Investigate costs and risks associated with various transportation systems options. Maintain reference transportation system to provide baseline tradeoff assumptions. Continue specified transportation systems support analyses to support identified program decisions, MRS and other OCRWM systems studies. Continue NSTI study.	Continue updating codes and support data bases necessary for purposes of performing cost/risk analyses, system tradeoff study, transportation logistics constraint analyses. Maintain reference transportation system to provide baseline tradeoff assumptions. Continue specified transportation systems support analyses to support identified program decisions, MRS and other OCRWM systems studies. Continue to conduct analyses and planning applicable to Program environmental requirements. Complete NSTI study.	Continue updating codes and support data bases necessary for purposes of performing cost/risk analyses, system tradeoff study, transportation logistics constraint analyses. Maintain reference transportation system to provide baseline tradeoff assumptions. Continue specified transportation systems support analyses to support identified program decisions, MRS and other OCRWM systems studies. Continue to conduct analyses and planning applicable to Program environmental requirements.	Continue updating codes and support data bases necessary for purposes of performing cost/risk analyses, system tradeoff study, transportation logistics constraint analyses. Maintain reference transportation system to provide baseline tradeoff assumptions. Continue specified transportation systems support analyses to support identified program decisions, MRS and other OCRWM systems studies. Continue to conduct analyses and planning applicable to Program environmental requirements.
	$ 2,326	$ 1,260	$ 1,675	$ 3,722	$ 3,999

III. Transportation, Systems Integration, and Engineering Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Program Management	Initiated implementation of QA program. Maintained cost and schedule reports and Program-level network schedules.	Continue implementation of QA program documents. Initiate development of transportation program level requirements and management document development. Maintain cost and schedule reports and Program-level network schedules.	Continue development of QA program documents and planning activities. Update program level requirements and management documents. Initiate QA audits. Maintain cost and schedule reports and Program-level network schedules.	Continue development of QA program documents and planning activities. Update program level requirements and management documents. Continue QA audits. Maintain cost and schedule reports and Program-level network schedules.	Continue development of QA program documents and planning activities. Update program level requirements and management documents. Continue QA audits. Maintain cost and schedule reports and Program-level network schedules.
	$ 1,986	$ 1,000	$ 1,175	$ 2,164	$ 2,465
Operations	Completed analysis of the status existing cask fleet and their transportation capabilities. Developed preliminary plan for operational testing of new cask fleet designs and interface with CSDP.	Continue interface cask operational testing plan with CSDP and initiate the development of operational test requirements.	Update generic plans for motor and rail carriers. Initiate development of capabilities for prototypical cask operational testing and continue interface with CSDP.	Continue with the development of capabilities for operational testing and develop alternative testing scenarios.	Complete development of capabilities for testing. Review generic plans for motor and rail carriers and determine need for updating.
	$ 271	$ 140	$ 350	$ 206	$ 609
Support Systems Development	Completed Cask Maintenance Facility (CMF) feasibility study and management structure options report. Initiated studies of existing operation activities. Initiated transportation operation studies of the Standard Utility Contract (10 CFR 961)	Finalize the Management Structure Options Report and initiate review of options for the CMF. Complete initial report on existing operational activities for loading of spent fuel and cask decontamination. Initiate review of FICA/NSTI data for site-specific analysis.	Complete transportation operational review of Standard Contract issues and support issue resolution process. Initiate study to obtain information on applicable foreign technology. Continue operational legal weight tractor evaluation. Continue site-specific analysis	Obtain information on technology and initiate integration into operational planning. Continue to support Standard Contract issue resolution process. Initiate intermodal evaluation. Continue site-specific analysis initiate the development of reactor transport plans,	Complete foreign technology information integration. Continue site-specific reactor analysis, development of service plans and analysis on and initiate need for site-specific upgrade projects. Continue DCS submittal support. Complete intermodal evaluation. Initiate

III. Transportation, Systems Integration, and Engineering Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Support Systems Development (Cont'd)	facility constraints on operational and fleet sizing options, and operational scenarios for the transportation system. Continued operations system engineering studies: including development of the transportation operations functional descriptions of issues. Provided an assessment of legal weight tractor specs, initiated interface with cask system trailer design and evaluated the need for a demonstration program. Developed a draft checklist of operational considerations for input into cask designs. Performed QA audits and maintained QA risk assessment requirements. Assessed future fuel shipment possibilities and initiate actions to address potential problems.	Continue 10 CFR 961 transportation operational scenarios studies. Initiate transportation performance requirements assessments and specifications for facility interface. Finalize preliminary cask fleet projections. Develop specifications for legal weight tractor. Evaluate CNF NRC license requirements. Initiate and provide operational review of cask preliminary designs. Continue to perform QA audits.	and operational scenario studies for support of DCS submittals. Evaluate and propose operations functional allocations. Complete CNF license and management structure analysis. Continue to perform QA audits and surveillance activities and maintain QA risk assessment requirements, and perform QA risk assessments and reviews. Continue development of tracking system and modification of display.	support DCS negotiations and response to submittals. Maintain repository/operations interface specs. Update CNF wet vs dry analysis. Update analysis of transportation regulations for operational impacts. Continue monitoring of existing casks, maintenance, and tractor issues. Continue to perform QA audits, audit training, and surveillance. Perform QA risk assessments and reviews. Update QA plan as necessary. Continue fuel shipment activities including cask and carrier selection. Continue development of tracking system and modification of display.	development of operating plans, support equipment scoping studies and technology needs. Review operating system requirements and allocations. Continue maintenance of interface specs, review and update TOE SRD. Complete foreign technology information integration. Continue site-specific reactor analysis, development of service plans and analysis on and initiate need for site-specific upgrade projects. Continue DCS submittal support. Complete intermodal evaluation. Initiate development of operating plans, support equipment scoping studies and technology needs. Review operating system requirements and allocations. Continue maintenance of interface specs, review and update TOE SRD. Continue to perform QA audits, audit training, and surveillance. Perform QA risk assessments and reviews. Update QA plan as necessary. Continue fuel shipment activities including

III. Transportation, Systems Integration, and Engineering Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Support Systems Development (Cont'd)					cask and carrier selection. Continue development of tracking system and modification of display.
	$ 2,332	$ 2,078	$ 2,310	$ 5,648	$ 5,764
Subtotal, Transportation	$ 24,000	$ 17,750	$ 19,910	$ 29,221	$ 39,584
Systems Integration					
Systems Requirements & Description	Updated program requirements baseline. Continue to develop program description and program operational scenario baselines. Continued to develop activity logic network and began maintenance program. Supported the configuration management system. Continued development of reference data base on waste inventories and characteristics, using updated waste stream information provided by defense waste generators and newly generated data on activated metals associated with spent fuel hardware. Participated in the spent-fuel acceptance issue resolution process involving	Continue to develop more detailed system baseline documents including the revised System Engineering Management Plan (SEMP), the Waste Management Systems Requirements (WMSR) volumes, and the Waste Management System Description (WMSD) as defined in the approved Funding Management System (FMS) manual. Continue to maintain and support the configuration management system by performing Secretariat functions for the Program Elements Control Board (PECB). Continue updating of reference data base on waste inventories and characteristics to incorporate data for newly generated wastes	Update baseline documents including systems requirements, description and interface. Continue to maintain and support the configuration management system. Refine system criteria for waste acceptance. Continue updating reference data base on waste inventories, reactor capabilities and waste characteristics. Continue to participate in the waste acceptance issue resolution process. Continue QA efforts including QA plan implementation review, assessments, surveillance and audit activities.	Update program baseline documents according to results of systems studies or special studies. Continue to maintain and support the configuration management system. Maintain and update program management plan and systems engineering documentation. Continue to update system data base to include waste inventories, reactor capabilities, and waste characteristics. Continue to participate in the waste acceptance issue resolution process. Support utility contract modification and strategy development. Continue QA efforts including QA plan review, assessments,	Continue to update program baseline documents, including system requirements, description and interfaces. Continue to maintain and support the configuration management system. Continue to update systems engineering documentation, including management plans. Continue updating reference data base waste inventories, reactor capabilities, and waste characteristics. Continue participation in the waste acceptance issue resolution process. Continue QA efforts including QA plan review, assessments, surveillance, and audit activities.

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III. Transportation, Systems Integration, and Engineering Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Systems Requirements & Description (Cont'd)	utility representatives and other program elements. Continued initial reactor interface assessment. Updated and implemented QA plans and provided assessments. Prior year unobligated funds of $990 were used to cover these activities.	from start-up of facilities for solidification of defense and West Valley high-level wastes. Continue participation in the spent fuel acceptance issue resolution process. Complete initial facility interface capability assessment (FILA). Continue QA efforts including QA plan implementation review, assessments, surveillance and audit activities. Prior year unobligated funds of $1,000 will also be used to cover these activities.		surveillance and audit activities.	
	$ 1,378	$ 2,047	$ 3,047	$ 2,160	$ 2,116
Systems Analysis Capabilities	Refined capabilities for systems engineering analysis to support the integration of program elements. Added capabilities to optimize system configuration. System analysis capabilities include system optimization, waste stream analysis, operations/logistics analysis, cost analysis, reliability/ availability/	Refine overall analysis capabilities to allow incorporation of state of the art storage technology into the system, including waste stream operations/logistics, cost, RAM, and risk analysis. Modify capabilities, as needed, to support specific applications to systems studies. Continue QA efforts including QA plan	As new information becomes available, continue updating of capabilities for analysis including waste stream, operations/logistics, cost, RAM and risk. Continue to modify capabilities, as needed, to support specific applications to systems studies or special studies. QA efforts including QA plan implementation	Continue updating analysis capabilities for waste stream, operations/logistics, cost, RAM and risk. Continue QA efforts including QA plan rev ew, assessments, surveillance and audit activities. Continue to modify capabilities, as needed, to support specific applications to systems studies or special studies.	Based on new design data and other information, update analysis capabilities for waste stream, operations/logistics, cost, ram, and risk. Continue to modify capabilities as needed, for specific applications to system studies. Continue QA efforts, including QA plan review and surveillance activities.

III. Transportation, Systems Integration, and Engineering Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Systems Analysis Capabilities (Cont'd)	maintainability (RAM) analysis. Updated and implemented QA plans and provide assessments $720 of prior year unobligated funds were used to cover these activities.	implementation review, assessments, surveillance and audit activities. Prior year unobligated funds of $500 will also be used to cover these activities.	review, assessments, surveillance and audit activities.		
	$ 969	$ 569	$ 1,069	$ 2,064	$ 2,569
Systems Engineering Studies	Continued to develop planning process by which system studies can be identified and prioritized. Conducted system engineering studies in support of system design and development in the areas of waste acceptance rates and logistics, waste heat management, waste treatement, and system concepts to enhance integration of the components into overall system. Conducted tradeoff studies to ensure selection of the best options based on performance, economics, and other tradeoffs. Continued to evaluate scenarios associated with the transportation cask acquisition program, the repository planning activities, and overall system	Using the systems study planning process, identify and conduct expanded and additional systems engineering studies in support of system designs and development in the areas of waste acceptance rates and logistics, waste heat management, waste treatment, RAM, and advanced system concepts. Enhance integration of the system components and optimize overall system. Propose tradeoff studies at subsystem levels to assess overall impacts for occupational dose reductions, transport/handling requirements, phased acceptance of various other high-level wastes, changes in aggregate receipt	Continue detailed and refined systems engineering studies in support of system design, modifications to systems operation, and optimization of various subsystem options that will impact system costs, reliability tradeoffs, waste acceptance procedures, storage options, and process costs. Conduct analyses to assess hot fuels handling, dose rates, refinements, and cost/reliability adjustments. QA efforts such as, QA plan implementation review, audit and surveillance activities and assessments continue at an enhanced level.	Continue detailed and refined systems engineering studies in support of system design, modifications in systems operation and optimization of various subsystem options that will impact system costs, reliability tradeoffs, waste acceptance procedures, storage options, and process costs. Conduct analyses according to priorities established by the systems study planning process in order to support program decision about configuration and function allocation. Continue QA efforts including QA plan implementation review, assessments, audit and surveillance activities.	Using the systems study planning process, continue to identify and conduct detailed systems engineering studies in support of system operation and optimization of various subsystem options that will impact system costs, waste acceptance procedures, and operational considerations including reliability. Continue QA efforts including QA plan implementation review, assessments, audit and surveillance activities.

III. Transportation, Systems Integration, and Engineering Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Systems Engineering Studies (Cont'd)	configuration. Updated and implemented QA plans and provided assessments. Used $930 of prior year unobligated funds.	rates, and specific storage options. Continue QA efforts including QA plan implementation review, assessments, audit and surveillance activities. Prior year unobligated funds of $500 will also be used to cover these activities.			
	$ 1,328	$ 835	$ 1,705	$ 6,698	$ 6,679
Special Studies	Continued system planning and program development activities. Continued interface with other program elements and utility industry regarding overall system planning. Conducted special analyses and participated in technical reviews and workshops. Conducted special reviews of technical reports and papers prepared by other program elements. Updated and implemented QA plans and provide assessments using $360 of prior year unobligated funds.	Accelerate system planning and program development activities. Continue interface with other program elements and utility industry regarding overall system planning. Conduct expanded special analyses and participate in technical reviews and workshops. Conduct special reviews of technical reports and papers produced by designers of various facilities and other documents to help management develop plans to minimize auxiliary waste streams at the facilities,	Continue expansion of system planning and program development activities. Continue interface with other program elements and utility industry regarding overall system planning. Conduct special analyses and participate in technical reviews and workshops. Continue QA efforts including QA plan implementation review, assessments, surveillance and audit activities.	Perform special studies based on solicitations from all waste management system participants, including the utilities, the Nuclear Waste Technical Review Board, and the States and Tribes. Conduct special studies that are appropriate to the development of the waste management system. Participate in technical reviews and workshops, as required. Continue QA efforts including QA plan implementation review, assessments, surveillance and audit activities.	Continue the performance of Special Studies that are appropriate to the development of the waste management system. Participate in technical reviews and workshops, as required. Conduct special analyses and interface with other program elements and utility representative as appropriate regarding overall plans. Continue QA efforts, including QA plan review, assessments, surveillance and audit activities.

III. Transportation, Systems Integration, and Engineering Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Special Studies (Cont'd)		achieve consistency in assessment of various facilities and operations and for other activities aimed at enhancing the viability of system design. Continue QA efforts including QA plan implementation review, assessments, surveillance and audit activities. Prior year unobligated funds of $300 will also be used to cover these activities.			
	$ 630	$ 146	$ 446	$ 3,607	$ 3,596
Program Management	Continued to provide Program Management support, based on responsibility for the overall performance of the Systems/Integration Program. Continued to provide periodic reports, budget analyses, and management of and direct participation in, as appropriate, activities within the Systems Integration Program.	Continue to provide Program Management support, based on responsibility for the overall performance of the Systems/Integration Program. Continue to provide periodic reports, budget analyses, and management of and direct participation in, as appropriate, activities within the Systems Integration Program. Prior year unobligated funds of $500 will be used to cover these activities.	Continue to provide Program Management support, based on responsibility for the overall performance of the Systems/Integration Program. Continue to provide periodic reports, budget analyses, and management of and direct participation in, as appropriate, activities within the Systems Integration Program.	Continue to provide Program Management support, based on responsibility for the overall performance of the Systems/Integration Program. Continue to provide periodic reports, budget analyses, and management of and direct participation in, as appropriate, activities within the Systems Integration Program.	Continue to provide Program Management support, based on responsibility for the overall performance of the Systems/Integration Program. Continue to provide periodic reports, budget analyses, and management of and direct participation in, as appropriate, activities within the Systems Integration Program.

III. Transportation, Systems Integration, and Engineering Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Program Management (Cont'd)	$ 695	$ 203	$ 703	$ 1,438	$ 1,480
Subtotal, Systems Integration	$ 5,000	$ 3,800	$ 6,970	$ 15,976	$ 16,440
Engineering Development					
Prototypic Consolidation Development Program	Awarded the Phase III contract for fabrication, installation and cold testing of the prototypical rod consolidation equipment. Provided extensive QA support to ensure compliance with Nuclear Quality Assurance (NQA-1) requirements included performing periodic contractor audits, equipment inspections, and reviewing contract deliverables. Continued fabrication of mock-up fuel. Initiated fabrication of round and square fuel canisters for testing program.	Complete delivery of mock-up fuels and fuel canisters to equipment contractor. Complete fabrication of all consolidation equipment. Complete construction of test facility. Begin installation of consolidation equipment in test facility. Complete all prerequisite test acceptance criteria and test procedure documentation. Provide extensive QA support to ensure compliance with Nuclear Quality Assurance (NQA-1) requirements including performing periodic contractor audits, equipment fabrication inspections, and witnessing of test activities. Partial funding for this activity will utilize $1,000 of prior year unobligated funds.	Complete Phase III of PCDP. Continue surveillance and monitoring. Decision point is reached on whether to proceed with Phase IV.	Complete shipments of equipment to INEL. Issue Final Report for Phase III. Assuming the decision is made to conduct the hot demonstration, initiate preparations for Phase IV. Begin design activities on enclosure for TAN facility. Initiate procurements for additional concrete cask dry storage. Complete NEPA documentation for Phase IV activities. Begin fuel shipments to INEL.	Complete shipments of equipment to INEL. Issue Final Report for Phase III. Assuming the decision is made to conduct the hot demonstration, initiate preparations for Phase IV. Begin design activities on enclosure for TAN facility. Initiate procurements for additional concrete cask dry storage. Complete NEPA documentation for Phase IV activities. Begin fuel shipments to INEL.

III. Transportation, Systems Integration, and Engineering Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Prototypic Consolidation Development Program (Cont'd)	$ 10,965	$ 450	$ 3,400	$ 12,512	$ 1,677
Non Fuel Bearing Components	No Activity.	No Activity.	No Activity.	No Activity.	Initiate work on development and demonstration of equipment to reduce the volume of non-fuel bearing components of consolidated spent fuel assemblies.
	$ 0	$ 0	$ 0	$ 0	$ 1,027
Concrete Cask Testing Project	Initiated cooperative agreement for procurement, testing and demonstration of prototype concrete sealed storage cask.	Complete cooperative agreement including testing and demonstration of one prototype concrete sealed storage cask. Issue reports. Prior year unobligated funds of 50K will be used to complete this activity.	No Activity	No Activity	No Activity
	$ 1,035	$ 0	$ 0	$ 0	$ 0

III. Transportation, Systems Integration, and Engineering Development (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Nuclear Fuel Services (NFS)	Obtained NRC certification of one cask to be used in NFS shipments and performed other pre-shipment activities. NFS utilized $2,000 of prior year funds.	Completed preparations for the shipment of spent fuel from West Valley to the Tan facility in dual purpose casks for demonstration of the use of these casks for transportation and dry storage. NFS will utilize $1,000 of prior year funds.	Investigate shipping commercial spent fuel from West Valley to the INEL TAN facility and consider the demonstration of dry storage of the dual purpose casks. This activity will utilize prior year funds.	No Activity.	No Activity.
	$ 0	$ 0	$ 0	$ 0	$ 0
Subtotal, Engineering Development	$ 12,000	$ 450	$ 3,400	$ 12,512	$ 2,704
Transportation, Systems Integration, and Engineering Development	$ 41,000	$ 22,000	$ 30,280	$ 57,709	$ 58,728

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
NUCLEAR WASTE FUND
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR WASTE FUND

I. Preface: Program Management and Technical Support

The activities detailed in this program division include Program Management (salaries, benefits, and travel); contractual services (administrative support cost, including office space, printing, telecommunications, and computer services); and technical support (Nuclear Waste Fund audit services and fee verification, technical support activities, program integration, external relations and policy, quality assurance (QA), Licensing Support System (LSS), fellowships, and historically black colleges and universities (HBCU) program). These activities will support program objectives, including detailed repository site evaluation, development of transportation system technologies, and activities associated with the design and implementation of a Monitored Retrievable Storage (MRS) facility. Adequate resources must be available during this budget period, in order to accomplish critical path activities associated with the Secretary's Near-Term Decision Schedule for the program, and to ensure Federal control and oversite and responsiveness to technical, fiduciary, quality assurance, and regulatory requirements imposed on the program.

II. A. Summary Table: Program Management and Technical Support

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change	FY 1992 Request	FY 1993 Request
Technical Support	$ 46,580	$ 43,278	$ 35,553	- 18	$ 68,495	$ 71,334
Program Management	17,410	17,076	17,136	0	23,599	23,575
Contractual Services and Supplies	8,142	6,644	6,644	0	8,347	8,446
Total, Program Management and Technical Support	$ 72,132	$ 66,998	$ 59,333	- 11	$ 100,441	$ 103,355

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II. B. Major Laboratory and Facility Funding:

	FY 1989	FY 1990	FY 1991	% Change	FY 1992	FY 1993
Battelle Memorial Institute (PNL)	2,240	1,225	2,275	86%	2,275	2,350
Chicago Operations Office	2,214	972	1,024	5%	1,724	1,800
Idaho Operations Office	1,063	510	580	14%	1,200	1,300
Nevada Operations Office	5,657	5,630	6,693	19%	9,045	10,000
Oak Ridge Associated Universities	830	390	925	137%	950	1,025
Oak Ridge National Laboratory	475	220	500	127%	500	525
Oak Ridge Operations Office	210	111	111	0%	125	150
Richland Operations Office	771	168	194	15%	315	315
Science Applications International Corporation	975	600	2,020	237%	2,000	2,000

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Program Management and Technical Support					
Technical Support	Continued independent financial audit activities, annual fee verification and calculation studies. Continued fund management activities, records management and litigation support Fellowship and MBCU programs.	Continue independent financial audit activities, annual fee verification and calculation studies; fund management activities, records management and litigation support, Fellowship and MBCU programs.	Continue independent financial audit activities, annual fee verification and calculation studies, and fund management activities. Continue records management activities in support of the LSS, and continue support of the Fellowship and MBCU programs.	Continue support of intensified independent financial audit activities, annual fee verification and calculation studies, and fund management activities. Continue management activities in support of the LSS, and continue support of the Fellowship and MBCU programs.	Continue support of intensified independent financial audit activities, annual fee verification and calculation studies, and fund management activities. Continue management activities in support of the LSS, and continue support of the Fellowship and MBCU programs.
	$7,980	$6,378	$5,160	$7,806	$8,055
	Continued technical and management support for international activities applicable and beneficial to OCRWM. Reviewed foreign waste policy activities. Continued technical and management support efforts for analysis of policy issues requiring program-wide evaluation and contingency planning. Continued cooperative activities with national organizations Support development and implementation of program-wide public education, information	Continue technical and management support for international activities applicable and beneficial to OCRWM. Review foreign waste management activities. Continue technical and management support efforts for analysis of policy issues requiring program-wide evaluation. Develop program-wide strategies and contingency plans. Provide technical support and coordination of program interactions with the Nuclear Waste Technical Review Board, Nuclear	Continue technical and management support for international activities applicable and beneficial to OCRWM. Continue review of foreign waste management activities. Increase technical and management support efforts for analysis of policy issues requiring program-wide evaluation. Develop program-wide strategies and contingency plans. Provide technical support and coordination of program interactions with the Nuclear Waste Technical Review Board, Nuclear	Continue technical and management support for international activities applicable and beneficial to OCRWM. Continue review of foreign waste management activities. Technical and management support efforts will continue for analysis of policy issues requiring program-wide evaluation. Develop program-wide strategies and contingency plans. Provide technical support and coordination of program interactions with the Nuclear Waste Technical	Continue technical and management support for international activities applicable and beneficial to OCRWM. Continue review of foreign waste management activities. Technical and management support efforts will continue for analysis of policy issues requiring program-wide evaluation. Develop program-wide strategies and contingency plans. Provide technical support and coordination of program interactions with the Nuclear Waste Technical

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III. Program Management and Technical Support (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Technical Support (Cont'd)	and outreach programs. $6,425	Waste Negotiator, Onsite Representative, and NRS Review Commission. Continue cooperative activities with national organizations. Support development and implementation of program-wide public education, information and outreach programs. $4,400	Waste Negotiator, and Onsite Representative. Continue cooperative activities with national organizations. Support development and implementation of program-wide public education, information and outreach programs. $4,970	Review Board, Nuclear Waste Negotiator, and Onsite Representative. Continue cooperative activities with national organizations Support development and implementation of program-wide public education, information and outreach programs. $6,152	Review Board, Nuclear Waste Negotiator, and Onsite Representative. Continue cooperative activities with national organizations. Support development and implementation of program-wide public education, information and outreach programs. $6,166
	Continued program technical support and integration efforts to assist OCRWM in planning and reviewing activities associated with the waste management disposal system. $15,200	Continue to provide Program technical support and integration efforts to assist OCRWM in planning and reviewing activities associated with the waste management disposal system continues. $19,000	Consistent with increasing program pace, continue to provide program technical support and integration efforts to assist OCRWM in planning and reviewing activities associated with the waste management disposal system. These activities will utilize $6,500 of prior year funds. $12,423	Continue to provide program technical support and integration efforts to assist OCRWM in planning and reviewing activities associated with the waste management disposal system. $17,519	Continue to provide program technical support and integration efforts to assist OCRWM in planning and reviewing activities associated with the waste management disposal system. $17,500

III. Program Management and Technical Support (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Technical Support (Cont'd)	Continued funding for the LSS support services functions using $1,000 of prior year funds. $6,000	Continue funding for LSS contractual support services functions. $3,100	Support for LSS specification and procurement package development. $3,500	Initiate LSS equipment purchases and initial implementation; and initiate contractual support functions for operations. $24,395	Continue procurement, LSS installation, and operations support. $26,405
	Continued funding support for development, implementation, management and operation of the program-wide Information Resource Management Program. $5,000	Continue funding support for development, implementation, management and operation of the program-wide Information Resource Management Program. $7,900	Continue funding support for development, implementation, management and operation of the program-wide Information Resource Management Program. This activity will also utilize prior year funds. $6,500	Continue funding support for development, implementation, management and operation of the program-wide Information Resource Management Program. $8,089	Continue funding support for development, implementation, management and operation of the program-wide Information Resource Management Program. $8,396
	Provided funding to support centralized oversight and management of program-wide QA activities. $2,975	Continue to provide funding to support centralized oversight and management of program-wide QA activities. $2,500	Continue to provide funding to support the centralized oversight and management of enhanced program-wide QA activities. $3,000	Continue to provide funding to support the centralized oversight and management of enhanced program-wide QA activities. $4,534	Continue to provide funding to support the centralized oversight and management of enhanced program-wide QA activities. $4,632

III. Program Management and Technical Support (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Technical Support (Cont'd)	Transfer of funds for the Nuclear Waste Technical Review Board was completed. A negotiator was not appointed in FY 1989; therefore, funds appropriated for the negotiator were not transferred as originally planned. The NRC Review Commission activities were continued using $3,100 of prior year funds.	Funds for the Nuclear Waste Technical Review Board and Nuclear Waste Negotiator, in support of the Radioactive Waste Management Program, will be included in a separate Budget Request which will be submitted by each organization. However, as in prior years, the funds will be debited to the Nuclear Waste Fund.	Funds for the Nuclear Waste Technical Review Board and Nuclear Waste Negotiator, in support of the Radioactive Waste Management Program, will be included in a separate Budget Request which will be submitted by each organization. However, as in prior years, the funds will be debited to the Nuclear Waste Fund.	Funds for the Nuclear Waste Technical Review Board and Nuclear Waste Negotiator, in support of the Radioactive Waste Management program, will be included in a separate Budget Request which will be submitted by each organization. However, as in prior years, the funds will be debited to the Nuclear Waste Fund.	Funds for the Nuclear Waste Technical Review Board and Nuclear Waste Negotiator, in support of the Radioactive Waste Management program, will be included in a separate Budget Request which will be submitted by each organization. However, as in prior years, the funds will be debited to the Nuclear Waste Fund.
	$3,000	$0	$0	$0	$0
	$ 46,580	$ 43,278	$ 35,553	$ 68,495	$ 71,334
Program Management	Oversaw first repository site characterization work, including issuing Site Characterization Plan. Reviewed geological and hydrological data. Oversaw liaison with the State of Nevada, Indian Tribes, and local governments. Managed contract closeout activities at Basalt and Salt sites and managed reclamation activities as appropriate. Interactions were continued with Nuclear Regulatory Commission (NRC) on licensing matters. Managed	Oversee first repository site characterization work, initiating prototype and site suitability, surface-based testing and work in exploratory shaft facility evaluation and design. Review geological and hydrological data. Continue liaison with the State of Nevada and local governments for the selected site. Continue extensive, in-depth interactions with NRC on licensing matters.	Oversee first repository site characterization work, including management of site suitability, surface-based testing, exploratory shaft facilities, and review of geological and hydrological data. Continue liaison with the State of Nevada, and local governments. Continue extensive, in-depth interactions with NRC on licensing matters.	Oversee first repository site characterization work, including management of surface-based testing, exploratory shaft facilities evaluation and design, and review of geological and hydrological data. Continue liaison with the State of Nevada, and local governments. Continue extensive, in-depth interactions with NRC on licensing matters. Initiate waste package and repository design work.	Oversee first repository site characterization work, including management of surface-based testing, exploratory shaft facilities construction excavation, and review of geological and hydrological data. Continue liaison with the State of Nevada, and local governments. Continue extensive, in-depth interactions with NRC on licensing matters. Manage all facets of ongoing waste package and repository design work.

III. Program Management and Technical Support (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Program Management (Cont'd)	on-going waste package and repository design work, and planning for Environmental Impact Statement and license application.				
	Managed and oversaw activities to meet restructured program schedules, specifically: Oversaw and managed the implementation of a quality assurance program. This program provided assurances to OCRWM management that the technical activities were conducted in such a way as to appropriately address those issues relating to public health and safety and the protection of the environment and meet the licensing requirements established by the NRC.	Manage and oversee activities to meet schedules, specifically: Continue to oversee, manage, and report on progress made in the implementation of a quality assurance program. This program provides assurances to OCRWM management that the technical activities are conducted in such a way as to appropriately address those issues relating to public health and safety and the protection of the environment and meet the licensing requirements established by the NRC. Establish and monitor implementation of QA administrative procedures and implementing line procedures throughout organization, and take corrective action where needed.	Manage and oversee activities to meet schedules, specifically: Continue to oversee, manage, and report on progress made in the implementation of a quality assurance program. This program provides assurances to OCRWM management that the technical activities are conducted in such a way as to appropriately address those issues relating to public health and safety and the protection of the environment and meet the licensing requirements established by the NRC. Establish and monitor implementation of QA administrative procedures and implementating line procedures throughout organization, and take corrective action where needed.	Manage and oversee activities to meet schedules, specifically: Continue to oversee, manage, and report on progress made in the implementation of a quality assurance program. This program provides assurances to OCRWM management that the technical activities are conducted in such a way as to appropriately address those issues relating to public health and safety and the protection of the environment and meet the licensing requirements established by the NRC. Establish and monitor implementation of QA administrative procedures and implementating line procedures throughout organization, and take corrective action where needed.	Manage and oversee activities to meet schedules, specifically: Continue to oversee, manage, and report on progress made in the implementation of a quality assurance program. This program provides assurances to OCRWM management that the technical activities are conducted in such a way as to appropriately address those issues relating to public health and safety and the protection of the environment and meet the licensing requirements established by the NRC. Establish and monitor implementation of QA administrative procedures and implementating line procedures throughout organization, and take corrective action where needed.

III. Program Management and Technical Support (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Program Management (Cont'd)	Oversaw from-reactor cask development project, ongoing transportation program institutional & governmental liaison, and oversaw study of full service transportation operation. Managed baseline Systems Requirements and Description document. Developed detailed descriptions of interfaces between each element of the Civilian Radioactive Waste Management System. Initiated MRS development activities including interactions with MRS Review Commission. Prepared for interactions with the Nuclear Waste Negotiator and began interactions with Nuclear Waste Technical Review Board.	Initiate MRS development activities, including a generic conceptual design, and initiate site screening methodology. Oversee from-reactor cask development project, ongoing transportation program institutional & governmental liaison, and oversee study of full service transportation operation. Manage baseline Systems Requirements and Description document and interfaces between each element of the Civilian Radioactive Waste Management System. Complete interactions with MRS Review Commission, including interactions and responses to queries arising from the Commission's report to Congress. Initiate interactions with the Nuclear Waste Negotiator and conduct increased interactions with Nuclear Waste Technical Review Board.	Complete MRS generic conceptual design and initiate engineering studies to resolve design issues. Conduct survey and evaluation of potentially suitable sites. Negotiate financial assistance agreements with States and units of local government on MRS siting activities. Oversee from-reactor cask development project, ongoing transportation program institutional & governmental liaison, and oversee study of full service transportation operation. Manage baseline Systems Requirements and Description document and interfaces between each element of the Civilian Radioactive Waste Management System.	Start Title I design for MRS and continue MRS development activities, including siting evaluations. Complete from-reactor cask final design, ongoing transportation program institutional & governmental liaison, and oversee study of full service transportation operation. Manage baseline Systems Requirements and Description document and interfaces between each element of the Civilian Radioactive Waste Management System.	Oversee from-reactor cask development project, ongoing transportation program institutional & governmental liaison, and oversee study of full service transportation operation. Manage baseline Systems Requirements and Description document and interfaces between each element of the Civilian Radioactive Waste Management System.

III. Program Management and Technical Support (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Program Management (Cont'd)	Managed MWF resources and conducted cost and fee adequacy analyses. Managed the Standard Contract for Disposal of Spent Nuclear Fuel and/or High Level Radioactive Waste. Developed the Annual Capacity Report (ACR) and continued the ACR Issue Resolution Process. Maintained program cost and schedule baselines, including preparation of budgets, financial documents and MWF management report. Completed revision of Program Management System (PMS) Manual and Program Management System (PMS) Implementation Plan. Oversaw PMS and Program Change Control Board process. Submitted Annual Report to Congress. Began implementation of the revised basis for the ongoing 1M/KWH fee resulting from U.S. Court of Appeals Decision.	Provide essential management of MWF resources and conduct cost and fee adequacy analyses. Prepare the ACR and initiate developmental work on a Delivery Commitment Schedule. Maintain program cost and schedule baselines, including financial, and MWF management report. Complete revision of PMS Manual, Program Control Procedures and PMS Implementation Plan, as required by restructured program. Implement revised PMS and manage change control process, provide Executive Secretariat support to Program Change Control Board. Submit Annual Report to Congress, and manage institutional planning and outreach activities. Complete formal rulemaking to implement the U.S. Court of Appeals decision concerning the 1 mill/KWH fee.	Manage MWF resources and conduct cost and fee adequacy analyses, preparing the First Annual Acceptance Priority Ranking Report (AAPR). Continue the ACR Issue Resolution Process. Complete developmental work on a Delivery Commitment Schedule. Maintain program cost and schedule baselines, including preparation of budgets, financial documents and MWF management report. Oversee PMS and change control process. Submit Annual Report to Congress.	Manage MWF resources and conduct cost and fee adequacy analyses, preparing the Second AAPR Report Analysis and approve/disapprove Delivery Commitment Schedules for Spent Nuclear Fuel and High Level Waste acceptance from contract holders. Maintain program cost and schedule baselines, including preparation of budgets, financial and MWF management report. Oversee PMS and change control process. Submit Annual Report to Congress.	Manage MWF resources and conduct cost and fee adequacy analyses, preparing the Third AAPR Report. Analyze and approve/disapprove Delivery Commitment Schedules. Maintain program cost and schedule baselines, including preparation of budgets, financial and MWF management report. Oversee PMS and change control process. Submit Annual Report to Congress.

III. Program Management and Technical Support (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Program Management (Cont'd)	Began complete revision of Project Decision Schedule (PDS). Provided full administrative support services. Managed the development of program-wide public education/information programs including analysis of State and local school curricula. Developed and managed external communications policies and plans. Implemented international cooperative activities beneficial to the OCRM Program. Managed high volumes of official records. Received matrix support for legal, administrative, financial, environmental, safety, health, and Congressional liaison activities. Prepared second amendment to OCRM Mission Plan, including responses to comments on the draft amendment. Managed cooperative agreements with national organizations to encourage citizen participation in repository development as prescribed by law. Assisted in planning for international	Initiate discussion/negotiation with other agencies regarding revised PDS; publish and implement revised PDS. Provide full administrative support services. Manage high volume of official records. Receive matrix support for Legal, administrative, financial, environmental, safety, health, and Congressional Liaison activities. Develop any needed further revisions to OCRM Mission Plan. Manage cooperative agreements with national organizations. Manage strategic and contingency program planning efforts.	Develop PDS schedule changes and prepare reports to Congress as necessary. Provide full administrative support services. Develop and manage external communications policies and plans. Oversee implementation of international cooperative activities beneficial to OCRM Program. Manage official records. Receive matrix support for legal, administrative, financial, environmental, safety, health, and Congressional liaison activities. Develop any needed further revisions to OCRM Mission Plan. Manage cooperative agreements with national organizations. Manage strategic and contingency program planning efforts.	Develop PDS schedule changes and prepare reports to Congress as necessary. Provide full administrative support services. Manage the development and implementation of program-wide public education, information and outreach programs. Direct full implementation of university support program. Develop and manage external communications policies and plans. Oversee implementation of international cooperative activities beneficial to OCRM Program. Manage high volume of official records. Receive matrix support for legal, administrative, financial, environmental, safety, health, and Congressional liaison activities. Develop any needed further revisions to OCRM Mission Plan. Manage cooperative agreements with national organizations. Manage strategic and contingency program planning efforts.	Develop PDS schedule changes and prepare reports to Congress as necessary. Provide full administrative support services. Manage the development and implementation of program-wide public education, information and outreach programs. Direct full implementation of university support program. Develop and manage external communications policies and plans. Oversee implementation of international cooperative activities beneficial to OCRM Program. Manage high volume of official records. Receive matrix support for legal, administrative, financial, environmental, safety, health, and Congressional liaison activities. Develop any needed further revisions to OCRM Mission Plan. Manage cooperative agreements with national organizations. Manage strategic and contingency program planning efforts.

III. Program Management and Technical Support (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Program Management (Cont'd)	conference on HLW management. Managed development of program strategic and contingency planning efforts.				
	$ 17,410	$ 17,076	$ 17,136	$ 23,599	$ 23,575
Contractual Services and Supplies	Continued administrative support services including employee development, printing, reproduction, office space, equipment rental, postage, telecommunications, materials, supplies, and ADP/MIS technical support. Continued additional mainframe use, timesharing data preparation support, and continued upgrade of workstation and MIS software.	Continue administrative support services including employee development, printing, reproduction, office space, equipment rental, postage, telecommunications, materials, supplies, and ADP/MIS technical support. Continue additional mainframe use, timesharing data preparation support, and continue upgrade of workstation and MIS software.	Continue administrative support services including employee development, printing, reproduction, office space, equipment rental, postage, telecommunications, materials, supplies, and ADP/MIS technical support. Continue additional mainframe use, timesharing data preparation support, and continue upgrade of workstation and MIS software.	Continue administrative support services including employee development, printing, reproduction, office space, equipment rental, postage, telecommunications, materials, supplies, and ADP/MIS technical support. Continue additional mainframe use, timesharing data preparation support, and continue upgrade of workstation and MIS software.	Continue administrative support services including employee development, printing, reproduction, office space, equipment rental, postage, telecommunications, materials, supplies, and ADP/MIS technical support. Continue additional mainframe use, timesharing data preparation support, and continue upgrade of workstation and MIS software.
	$ 8,142	$ 6,644	$ 6,644	$ 8,347	$ 8,446
Program Management and Technical Support	268.0 FTE $ 72,132	249.0 FTE $ 66,998	250.0 FTE $ 59,333	319.0 FTE $ 100,441	319.0 FTE $ 103,355

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
NUCLEAR WASTE FUND
(dollars in thousands)

KEY ACTIVITY SUMMARY

NUCLEAR WASTE FUND

I. Preface: Nuclear Regulatory Commission Fees

This program subdivision provides funding for Nuclear Regulatory Commission (NRC) tasks as delineated in the NRC Budget Request.

II. A. Summary Table: Nuclear Regulatory Commission Fees

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change	FY 1992 Request	FY 1993 Request
Nuclear Regulatory Commission Fees	$ 15,000	$ 27,100	$ 0	-100	$ 0	$ 0
Total, Nuclear Regulatory Commission Fees	$ 15,000	$ 27,100	$ 0	-100	$ 0	$ 0

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993
Nuclear Regulatory Commission Fees	Provided for the payment of fees to NRC for licensing activities as described in NRC budget request and conducted in accordance with the NWPA.	To provide for the payment of fees to NRC for licensing activities conducted in FY 1989 as described in NRC budget request and conducted in accordance with the NWPA.	Funds for NRC licensing activities in support of the Civilian Radioactive Waste Management Program will be included in the budget request for the NRC. However, as in prior years, the funds will be debited from the Nuclear Waste Fund.	Funds for NRC licensing activities in support of the Civilian Radioactive Waste Management Program will be included in the budget request for the NRC. However, as in prior years, the funds will be debited from the Nuclear Waste Fund.	Funds for NRC licensing activities in support of the Civilian Radioactive Waste Management Program will be included in the budget request for the NRC. However, as in prior years, the funds will be debited from the Nuclear Waste Fund.
	$ 15,000	$ 27,100	$ 0	$ 0	$ 0
Nuclear Regulatory Commission Fees	$ 15,000	$ 27,100	$ 0	$ 0	$ 0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
NUCLEAR WASTE FUND
(Obligations dollars in thousands)

OBJECT CLASS SUMMARY

Nuclear Waste Fund

		FY 1989	FY 1990	FY 1991
	Personnel compensation:			
11.1	Full-time permanent	$ 12,133	$ 12,880	$ 12,930
11.3	Positions other than full-time permanent	616	178	178
11.5	Other personnel compensation	241	142	142
	Special personal services payments	8	---	---
11.9	Total personnel compensation	12,998	13,200	13,250
12.1	Personnel benefits	2,083	2,376	2,386
13.1	Benefits for former personnel	15	25	25
21.0	Travel and transportation of persons	1,212	1,500	1,500
22.0	Transportation of things	57	225	225
23.1	Standard level user charges	1,072	3,020	3,020
23.2	Rental payments to others	---	1,781	1,781
23.3	Comm util and misc. charges	699	468	468
24.0	Printing and reproduction	47	700	700
25.0	Other services	322,805	246,811	239,128
26.0	Supplies and materials	662	450	450
31.0	Equipment	8,521	6,600	11,900
32.0	Land and structures	---	400	400
41.0	Grants, subsidies and contributions	14,619	17,600	17,600
	Totals	$364,790	$295,156	$292,833

DOE/MA-0099
Volume 4 of 5

United States Department of Energy
Fiscal Year 1991

Congressional Budget Request

Geothermal Resources Development Fund
Power Marketing Administrations
Departmental Administration
Inspector General

Volume 4

(1265)

Assistant Secretary,
Management and Administration
Office of the Controller

January 1990

DEPARTMENT OF ENERGY

FISCAL YEAR 1991 CONGRESSIONAL BUDGET REQUEST

GEOTHERMAL RESOURCES DEVELOPMENT FUND
POWER MARKETING ADMINISTRATIONS
DEPARTMENTAL ADMINISTRATION
OFFICE OF INSPECTOR GENERAL

VOLUME 4

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Department of Energy
FY 1991 Congressional Request

Summary of Estimates by Appropriation
Budget Authority
(Dollars in Million)

	FY 1989 Actual	FY 1990 Approp.	FY 1991 Departmental Request
Appropriation Before the Energy and Water Development Subcommittees:			
Atomic Energy Defense Activities	$6,752,575	$7,722,905	$8,592,000
General Science and Research Activities	908,471	1,093,316	1,273,732
Isotope Production and Distribution Fund	(209)	16,016	0
Energy Supply Research and Development	1,848,973	1,892,087	2,085,237
Environmental Restoration and Waste Management	1,657,347	2,218,317	2,791,436
Uranium Supply and Enrichment Activities	(244,053)	(4,745)	0
FERC - Salaries and Expenses	108,760	114,918	122,750
Nuclear Waste Disposal Fund	366,832	295,156	292,833
Geothermal Resources Development Fund	75	74	80
Power Marketing Administrations:			
Alaska Power Administration	3,159	3,134	3,233
Bonneville Power Administration	159,517	258,200	170,100
Southeastern Power Administration	36,267	18,456	9,285
Southeastern - Continuing Fund	3,072	0	0
Southwestern Power Administration	15,389	25,257	20,107
Western Area Power Administration	271,145	294,218	298,464
Total, Power Marketing Administrations	488,549	599,065	501,189
Departmental Administration	213,848	202,185	224,427
Office of Inspector General	20,959	22,638	28,421
Total, Appropriation Before the Energy And Water Development Subcommittees	$12,122,127	$14,171,932	$15,912,105

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Department of Energy
FY 1991 Congressional Request

Summary of Estimates by Appropriation
Budget Authority
(Dollars in Million)

	FY 1989 Actual	FY 1990 Approp.	FY 1991 Departmental Request
Appropriation Before the Interior and Related Agencies Subcommittees:			
Clean Coal Technology	187,800	554,000	456,000
Fossil Energy Research and Development	380,025	416,641	202,309
Naval Petroleum and Oil Shale Reserve	185,071	189,439	210,610
Energy Conservation	316,809	370,918	182,591
Energy Regulation	18,668	18,198	16,408
Emergency Preparedness	6,154	6,551	6,467
Strategic Petroleum Reserve	173,421	192,483	195,633
Strategic Petroleum Account	242,000	435,865	228,393
Energy Information Activities	62,856	64,319	66,608
Total, Appropriation Before the Interior and Related Agencies Subcommittees	1,572,804	2,248,414	1,565,019
Total, Appropriation Before the Energy and Water Development Subcommittees	12,122,127	14,171,932	15,912,105
Payment to States	2,249	2,249	2,343
Total, Department of Energy	$13,697,180	$16,422,595	$17,479,467

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1989 FTE USAGE	FY1990 -FY89	FY1990 CONGR REQ	FY1991 -FY90	FY1991 CONGR REQ
ENERGY & WATER SUBCOMMITTEE					
HEADQUARTERS	4,926	558	5,484	99	5,583
FIELD	9,480	-63	9,417	-179	9,238
SUBCOMMITTEE TOTAL	14,406	495	14,901	-80	14,821
INTERIOR SUBCOMMITTEE					
HEADQUARTERS	1,212	-42	1,170	-52	1,118
FIELD	917	12	929	-90	839
SUBCOMMITTEE TOTAL	2,129	-30	2,099	-142	1,957
GRAND TOTAL	16,535	465	17,000	-222	16,778
ADJUSTMENT				-16	-16
ADJUSTED TOTAL	16,535	465	17,000	-238	16,762

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1989 FTE USAGE	FY1990 -FY89	FY1990 CONGR REQ	FY1991 -FY90	FY1991 CONGR REQ
10.ENERGY SUPPLY RESEARCH AND DEV	934	118	1,076	7	1,083
HEADQUARTERS	678	119	797	7	804
FIELD	280	-1	279	0	279
15.URANIUM ENRICHMENT	62	5	67	0	67
HEADQUARTERS	52	4	56	0	56
FIELD	10	1	11	0	11
17.ISOTOPE PRODUCTION AND DISTRIB	0	2	2	0	2
HEADQUARTERS	0	2	2	0	2
20.GENERAL SCIENCE AND RESEARCH	49	37	86	12	98
HEADQUARTERS	49	37	86	12	98
25.ATOMIC ENERGY DEFENSE ACTIVITI	2,999	411	3,410	45	3,455
HEADQUARTERS	556	267	817	40	857
FIELD	2,443	144	2,593	5	2,598
27.ENV RESTORATION & WASTE MGT	68	113	181	20	201
HEADQUARTERS	68	36	96	20	116
FIELD	0	77	85	0	85
30.DEPARTMENTAL ADMINISTRATION	3,367	-290	3,147	0	3,147
HEADQUARTERS	1,692	-20	1,672	0	1,672
FIELD	1,653	-148	1,475	0	1,475
32.INSPECTOR GENERAL	189	51	240	16	256
HEADQUARTERS	189	51	240	16	256
34.ALASKA POWER ADMINISTRATION	31	4	35	0	35
FIELD	31	4	35	0	35
36.BONNEVILLE POWER ADMIN	3,310	-80	3,230	-100	3,130
FIELD	3,310	-80	3,230	-100	3,130
38.SOUTHEASTERN POWER ADMIN	38	2	40	0	40
FIELD	38	2	40	0	40
42.SOUTHWESTERN POWER ADMIN	186	-2	184	2	186
FIELD	186	-2	184	2	186
44.WAPA - POWER MARKETING	1,163	-20	1,143	-83	1,060
FIELD	1,163	-20	1,143	-83	1,060
50.WAPA - COLORADO RIVER BASIN	248	0	248	0	248
FIELD	248	0	248	0	248
52.FEDERAL ENERGY REGULATORY COMM	1,497	73	1,570	0	1,570
HEADQUARTERS	1,497	73	1,570	0	1,570
54.NUCLEAR WASTE FUND	268	-19	249	1	250
HEADQUARTERS	158	-11	147	4	151
FIELD	110	-8	102	-3	99
56.GEOTHERMAL RESOURCES DEV FUND	1	0	1	0	1
HEADQUARTERS	1	0	1	0	1
63.CLEAN COAL TECHNOLOGY	53	5	58	5	63
HEADQUARTERS	21	5	26	0	26
FIELD	32	0	32	5	37
65.FOSSIL ENERGY RESEARCH AND DEV	739	-22	717	-78	639
HEADQUARTERS	172	-35	137	18	155
FIELD	567	13	580	-96	484
70.NAVAL PETROL & OIL SHALE RES	92	-3	89	2	91
HEADQUARTERS	19	-1	18	2	20
FIELD	73	-2	71	0	71
75.ENERGY CONSERVATION	339	13	352	-64	288
HEADQUARTERS	208	10	218	-47	171
FIELD	131	3	134	-17	117
80.EMERGENCY PREPAREDNESS	69	2	71	0	71
HEADQUARTERS	69	2	71	0	71
81.ECONOMIC REGULATION	235	-29	206	-25	181
HEADQUARTERS	233	-29	204	-25	179
85.STRATEGIC PETROLEUM RESERVE	148	0	148	0	148
HEADQUARTERS	28	2	30	0	30
FIELD	114	-2	112	0	118
90.ENERGY INFORMATION ACTIVITIES	462	4	466	0	466
HEADQUARTERS	462	4	466	0	466
GRAND TOTAL	16,933	465	17,000	-222	16,778
ADJUSTMENT				-16	-16
ADJUSTED TOTAL	16,333	465	17,000	-238	16,762

VOLUME 4

GEOTHERMAL RESOURCES DEVELOPMENT FUND

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GEOTHERMAL RESOURCES DEVELOPMENT FUND

PROPOSED APPROPRIATION LANGUAGE

Geothermal Resources Development Fund

For carrying out the Loan Guarantee and Interest Assistance Program as authorized by the Geothermal Energy Research, Development and Demonstration Act of 1974, as amended, [$75,000] $80,000, to remain available until expended: Provided, That the indebtedness guaranteed or committed to be guaranteed through funds provided by this or any other appropriation Act shall not exceed the aggregate of $500,000,000. (Energy and Water Development Appropriations Act, 1990.)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
GEOTHERMAL RESOURCES DEVELOPMENT FUND

OVERVIEW

GEOTHERMAL RESOURCES DEVELOPMENT FUND

The Geothermal Resources Development Fund (GRDF) supports maintenance activities for the Geothermal Loan Guaranty Program (GLGP), authorized by the Geothermal Energy Research, Development and Demonstration Act of 1974, Public Law 93-410, as amended. The purpose of the GLGP was to encourage the commercial production of geothermal energy by guaranteeing lenders against losses on loans made to qualified geothermal projects, thereby inducing lenders to allocate capital to such projects. The GLGP was intended to develop normal borrower-lender relationships leading to financing of geothermal projects without Federal involvement.

The GRDF serves as a reserve against defaults on loans guaranteed under the GLGP, as well as a source of funds for administrative support for the GLGP.

- Public Law 93-410 authorized total guaranty authority of $500 million. To date, 8 loan guaranties have been issued with a total face amount of $285.4 million. Of these, 4 loans have been repaid and the guaranties released ($99.4 million). The remaining 4 loans (with a total face amount of $184.6 million but actual disbursements of only $38.7 million) have defaulted and been paid off by DOE under its guaranty obligations.

By notice published in the Federal Register in March 1982, DOE announced that no further applications for guaranties would be accepted, although applications then on hand would be processed to completion. All such applications have been processed and the program is effectively administratively closed.

Continued program oversight is still required because of protracted litigation involving two of the projects and the disposition of collateral from a third.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

LEAD TABLE

GEOTHERMAL RESOURCES DEVELOPMENT FUND

Activity	FY 1989	FY 1990 1/	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Geothermal Resources Development Fund						
Operating Expenses	$ 75	$ 74	$ 74	$ 80	$ +6	$ +8%
TOTAL	$ 75	$ 74	$ 74	$ 80	$ +6	$ +8%
Summary						
Operating Expenses	$ 75	$ 74	$ 74	$ 80	$ +6	$ +8%
Total Program	$ 75	$ 74	$ 74	$ 80	$ +6	$ +8%
Staffing (FTE's)	1	1	1	1		

Authorizations:
- P.L. 93-410, "Geothermal Energy Research Development and Demonstration Act of 1974, Title II"
- P.L. 95-238, "Department of Energy Act of 1978 - Civilian Applications, Title V"
- P.L. 96-294, "Energy Security Act, Title VI"

1/ FY 1990 Reflects the final Gramm-Rudman-Hollings sequester adjustments and P.L. 101-164 reduction to fund anti-drug activities.

26-657 O—90—41

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GEOTHERMAL RESOURCES DEVELOPMENT FUND
(dollars in thousands)

SUMMARY OF CHANGES

Geothermal Resources Development Fund

FY 1990 Appropriation	$ 74
Adjustments	0
FY 1991 Base	74
Loan Evaluation and Guaranty Reserve	0
Interest Assistance	0
Program Direction	+6
FY 1991 Congressional Budget Request	$ 80

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GEOTHERMAL RESOURCES DEVELOPMENT FUND
(dollars in thousands)

KEY ACTIVITY SUMMARY

GEOTHERMAL RESOURCES DEVELOPMENT FUND

I. Preface: Geothermal Resources Development Fund

The Geothermal Resources Development Fund supports the Geothermal Loan Guaranty Program by serving as a reserve against defaults and as a source of funds for administrative support of the program. The Program continues to monitor three defaulted projects.

II. A. Summary Table: Geothermal Resources Development Fund

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Geothermal Resources Development Fund.....	$ 75	$ 74	$ 80	+ 8
Total, Geothermal Resources Development Fund	$ 75	$ 74	$ 80	+ 8

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Geothermal Resources Development Fund	One FTE and associated support to evaluate, manage, and provide government oversight of loan guaranty agreements, and restructure loans, if necessary.	One FTE and associated support to evaluate, manage and provide government oversight of loan guaranty agreements, and restructure loans, if necessary.	One FTE and associated support to evaluate, manage, and provide government oversight of loan guaranty agreements, and restructure loans, if necessary.
	$ 75	$ 74	$ 80
Geothermal Resources Development Fund	$ 75	$ 74	$ 80

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
GEOTHERMAL RESOURCES DEVELOPMENT FUND
(Obligations in thousands of dollars)

OBJECT CLASS SUMMARY

Geothermal Resources Development Fund

Direct Funding:	FY 1989	FY 1990	FY 1991
11.1 Full-time permanent	$63	$62	$67
11.3 Other than full-time permanent	0	0	0
11.5 Other personnel compensation	2	2	3
11.9 Total personnel compensation	65	64	70
12.1 Civilian personnel benefits	7	7	7
21.0 Travel and transportation of persons	3	3	3
25.0 Other services	0	0	0
31.0 Equipment	0	0	0
32.0 Land & structures	0	0	0
Totals	$75	$74	$80

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VOLUME 4

ALASKA POWER ADMINISTRATION

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ALASKA POWER ADMINISTRATION
OPERATION AND MAINTENANCE

PROPOSED APPROPRIATION LANGUAGE

For necessary expenses of operation and maintenance of projects in Alaska and of marketing electric power and energy, [$3,145,000] $3,233,000, to remain available until expended. (Energy and Water Development Appropriations Act of 1987, as included in Public Laws 99-591(e).)

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ALASKA POWER ADMINISTRATION

OVERVIEW

ALASKA POWER ADMINISTRATION

The Alaska Power Administration is responsible for operation, maintenance and marketing of power for Alaska's two Federal hydroelectric projects -- the 30 MW Eklutna Project near Anchorage and the 78 MW Snettisham Project near Juneau. Project facilities include dams, reservoirs, powerplants, transmission systems and necessary maintenance facilities. Power is marketed at wholesale to four Alaskan utilities. The Corps of Engineers is nearing completion of the Crater Lake addition to the Snettisham powerplant. Post construction work and operation and maintenance activities for the new unit will be assumed by APA. The new generating unit increases Snettisham capability by sixty-six percent. The projects represent a current Federal investment of $174,000,000, including Crater Lake addition, and a replacement value in excess of $336,000,000.

The FY 1991 request for funding and personnel ceilings assume continued operation of APA. However, DOE and APA will continue to pursue the completion of the sale of APA assets to the State of Alaska and a consortium of local interests. If Congressional authorization for the sale is received and closeout of APA activities is completed before the end of FY 1991, expenditures for the year could be substantially below the request.

The FY 1991 request also assumes that $200,000 in emergency funds appropriated in FY 1984 will remain available in FY 1991, and that no new emergency funds will be needed.

Program objectives in continuing operation, maintenance, and marketing of power from Eklutna and Snettisham are:

- Maximize energy production, provide reliable service to customers, and minimize long-term costs while protecting the Federal investment.
- Market power in accordance with authorizing legislation, continue full utilization of Eklutna and Snettisham energy and peaking capability.
- Perform all necessary maintenance to project facilities, including scheduling and installing necessary major replacements and improvements to those facilities, so long as the projects remain in Federal ownership.

- Continue to enhance public use of project lands and facilities.

- Cooperation with Alaska Department of Fish and Game in salmon production program at Snettisham Project, continue with Cook Inlet Aquaculture Association for their hatchery at Eklutna Project, and with Municipality of Anchorage on its Eklutna Water Supply Project.

Accomplishing the objectives outlined above will result in APA meeting its responsibility of operations, maintenance, and power marketing for the two Federal hydroelectric projects in Alaska.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

LEAD TABLE

Alaska Power Administration

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Operation and Maintenance	$ 3,279	$ 3,134	$ 3,134	$ 3,233	$ +99	+3%
Emergency Fund	0	0	0	0	0	0%
Total Alaska Power Administration	3,279	3,134	3,134	3,233	+99	+3%
Deferral Applied	-120	0	0	0	0	0%
Total Budget Authority	$ 3,159	$ 3,134 1/	$ 3,134	$ 3,233	$ +99	+3%
Staffing Total FTE	31	35	35	35		

Authorization:
- Section 302, Department of Energy Organization Act of 1977

1/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and P.L. 101-164 reductions to fund anti-drug activities.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

SUMMARY OF CHANGES

ALASKA POWER ADMINISTRATION

FY 1990 Appropriation	$ 3,134
Adjustments	0
FY 1991 Base	3,134
Operations and Maintenance	
- Major Maintenance Items, Eklutna and Snettisham	-170
- Equipment Purchases, Eklutna and Snettisham	-105
- Engineering Analysis, Eklutna and Snettisham	-221
- Major Maintenance Items; Eklutna and Snettisham	+423
- Environmental Activities; Eklutna and Snettisham	+129
- Equipment Replacement; Snettisham	+114
- Decrease in Operation, Maintenance, and Administration of programs	-71
FY 1991 Congressional Budget Request	$ 3,233

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OPERATION & MAINTENANCE, ALASKA POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

ALASKA POWER ADMINISTRATION

I. Preface: Operation and Maintenance

Alaska Power Administration is responsible for operation, maintenance, and marketing for two Federal hydroelectric projects in Alaska. The operating projects are the 30 megawatt (MW) Eklutna Project near Anchorage and the 78 (MW) Snettisham Project near Juneau. Project facilities include dams, reservoirs, power plants, transmission systems, and necessary maintenance facilities. Power is marketed at wholesale to four Alaskan utilities. The Corps of Engineers is nearing completion of the Crater Lake addition to the Snettisham powerplant. Post construction work and operation and maintenance activities for the new unit will be assumed by APA. The new generating unit increases Snettisham capability by sixty-six percent. The Projects represent a current Federal investment of $174,000,000 including Crater Lake addition, and a replacement value in excess of $336,000,000.

The FY 1991 request for funding and personnel ceilings assumes continued operation of APA. However, DOE and APA will continue to pursue the completion of the sale of APA assets to the State of Alaska and a consortium of local interests. If Congressional authorization for the sale is received and closeout of APA activities is completed before the end of FY 1991, expenditures for the year could be substantially below the request.

The FY 1991 request also assumes that $200,000 in emergency funds appropriated in FY 1984 will remain available in FY 1991, and that no new emergency funds will be needed.

Program objectives in operating, maintaining, and marketing power from Eklutna and Snettisham are:

- Maximize energy production, provide reliable service to customers, and minimize long-term costs while protecting the Federal investment.
- Perform all necessary maintenance to project facilities, including scheduling and installing major replacements and improvements so long as the projects remain in Federal ownership.
- Market power in accordance with authorizing legislation; continue full utilization of Eklutna and Snettisham energy and peaking capability.
- Continue to enhance public use of project lands and facilities.
- Continue cooperation with Alaska Department of Fish and Game in salmon production at Snettisham Project, cooperation with Cook Inlet Aquaculture Association's fish hatchery at Eklutna Project, and cooperation with the Municipality of Anchorage on its Eklutna Water Supply Project.
- Continue full range of administrative management services in support of program objectives.

II. A. Summary Table: Operation and Maintenance

Program Activity	FY 1988 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Major Replacements	$ 705	$ 496	$ 666	+ 34
Administrative Services	764	786	898	+ 14
Power Generation and Transmission	1,750	1,850	1,669	- 10
Deferrals	-120	0	0	0
Total, Operation and Maintenance	$ 3,159	$ 3,134	$ 3,233	+ 3

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Operation and Maintenance			
Major Replacements		Engineering design specification work is required on Eklutna stator windings.	At Eklutna, the major replacement schedule and maintenance histories indicate the following items will require replacement: generator main power cable, bus potential transformer, and an oil storage tank. Oil containment at the Eklutna substation will be investigated and designed as well. The above activities are necessary to promote consistent operation of the Eklutna powerplant and enhance compliance with environmental regulations.
	Initiate replacement of Eklutna generator windings. Project scheduled for completion in FY 1991. Total estimated cost over 3-year period is $1.5 million.	Oil containment barriers are required around the main unit transformers to prevent oil spills from draining into the tailrace area at Eklutna.	
	Replace battery banks and chargers at Snettisham submarine cable terminal buildings. Relocate battery chargers and inverter at Thane Substation to reduce noise level.	Vibration monitoring equipment will be installed on the units for monitoring and protecting against excessive vibration at Eklutna.	

III. Operation and Maintenance (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Major Replacements (Cont'd)	Replace electronic phone switching PABX at Snettisham to accommodate new station requirements for the Crater Lake addition. Also replace mobile radio system.	The unit 2 seal rings need to be replaced due to excess clearance and water leakage at Eklutna.	At Snettisham, testing will be performed to determine the condition of the generator stator windings and the 3 mile submarine cable. Oil containment will be investigated and designed in addition to site cleanup and other environmental activities. A small bridge will replace a washed crossing, and a replacement motor grader is required for remote road maintenance and snow removal.
	Equipment and vehicle replacements at Eklutna and Snettisham Projects: one 4x4 pickup truck and a 20-year old electric drive forklift.	The penstock requires repairs to prevent further flaking of coal tar at Eklutna.	
	Replace 115-kV air circuit breakers in Eklutna switch-yard with oil circuit breakers to facilitate unmanned operation and reduce need for constant maintenance.	Additional overhaul services outside of current manpower and equipment capabilities at Snettisham.	
	Purchase condition monitoring equipment for predictive maintenance program at Snettisham Project. Equipment is for monitoring the condition of the generators and turbines.	Purchase additional transducers and processing system to allow full condition monitoring of three units at Snettisham.	
	Repair Thane Substation road and ditches and pave between control building and warehouse to eliminate dust contamination of the new computer controlled SCADA system.	Engineering design specification work on Snettisham stator replacement project.	
		Specification study to determine requirements for raising permanent spillway, dam, and intake operating height approximately 25 feet to provide increased capacity.	
	$ 765	$ 495	$ 900

III. Operation and Maintenance (Cont'd)

Program Activity	FY 1988	FY 1990	FY 1991
Administrative Services	Continue full range of administrative and management services in support of power operation, maintenance, and marketing functions, including Administrator's Office and staff work in support of the proposed transfer.	Continue full range of administrative and management services in support of normal power operation, maintenance, and marketing functions. In addition, perform work necessary to transfer ownership of the newly constructed Crater Lake generating unit at Snettisham from the Corps of Engineers to APA, and perform work required to support the proposed divestiture of APA assets.	Continue full range of administrative and management services in support of power operation, maintenance, and marketing functions, including Administrator's Office and staff work in support of the proposed transfer.
	$ 754	$ 788	$ 806
Power Generation and Transmission	Normal, continuing operation, maintenance, and power marketing programs for Eklutna and Snettisham hydroelectric projects. Market an estimated 377 GWH with gross revenues of $9,049,000. Continue net-billing arrangements to cover costs of non-Federal operators at Snettisham and Eklutna Projects. Continue cooperation with Corps of Engineers toward early completion of Crater Lake Unit of Snettisham Project in FY 1989. Continue cooperation with State of Alaska on State salmon hatchery at Snettisham Project; with Cook Inlet Aquaculture Association's similar facility at Eklutna; and with Municipality of Anchorage on its Eklutna Water Supply Project.	Normal, continuing operation, maintenance, and power marketing programs for Eklutna and Snettisham hydroelectric projects. In addition, Snettisham project staff will assume operation and maintenance activities of the newly constructed Crater Lake generating unit, and perform major overhauls of the two existing Long Lake generating units. Market an estimated 384 GWH with gross revenues of $9,308,000. Continue cost-share contracts to cover air charter services to Snettisham and non-Federal operators at Snettisham and Eklutna projects. Continue cooperation with State of Alaska on State salmon hatchery at Snettisham Project; with Cook Inlet Aquaculture Association's similar facility at Eklutna; and with Municipality of Anchorage on its Eklutna Water Supply Project.	Normal, continuing operation, maintenance, and power marketing programs for Eklutna and Snettisham hydroelectric projects, including the Crater Lake addition. Market an estimated 366 GWH with gross revenues of $9,674,000. Continue cooperative agreements to cover costs of shared air charter services to Snettisham and to cover costs of non-Federal operators at Snettisham and Eklutna projects. Continue cooperation with State of Alaska on State salmon hatchery at Snettisham Project; with Cook Inlet Aquaculture Association's similar facility at Eklutna; and with Municipality of Anchorage on its Eklutna Water Supply Project.
	$ 1,750	$ 1,850	$ 1,888
Deferrals	-$ 120	$ 0	$ 0

III. Operation and Maintenance (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Operation and Maintenance	$ 3,159	$ 3,134	$ 3,233
Total Alaska Power Administration	$3,159	$3,134	$3,233

1989

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
POWER MARKETING ADMINISTRATION

REVENUE AND RECEIPT REPORT
(In thousands of dollars)

	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995
Alaska Power Administration							
Gross Receipts	$ 9,049	$ 9,247	$ 9,592	$ 9,909	$11,493	$11,723	$11,723
Receipts:							
Sale and transmission of electric energy - Eklutna Project	$ 3,066	$ 3,096	$ 3,096	$ 3,096	$ 3,096	$ 3,096	$ 3,096
Sale and transmission of electric energy - Snettisham Project	$ 5,983	$ 6,151	$ 6,496	$ 6,813	$ 8,397	$ 8,627	$ 8,627
Net billing amount credited back to appropriation as an offsetting receipt	$ 300	$ 290	$ 293	$ 298	$ 303	$ 307	$ 311
Percent of sales to preference customers	34%	33%	32%	31%	27%	26%	26%
Energy Sales from Power Marketed (billions of kilowatt hours)	.4	.4	.4	.4	.4	.4	.4

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
SYSTEM STATISTICS

ALASKA POWER ADMINISTRATION
(dollars in thousands)

	Actual FY 1989	FY 1990	FY 1991
Generating capacity:			
Installed capacity (kW)	108,160	108,160	108,660
Leasing capacity (kW)	0	0	0
Peak capacity (kW)	108,160	108,160	108,660
Generating stations:			
Generating projects (No.)	2	2	2
Substations/switchyards (No.)	5	5	5
Substations/switchyards (capacity)	237,000	237,000	237,000
Available energy:			
Energy generated (MWh)	394,667	403,000	418,000
Energy purchased (MWh)	0	0	0
Energy available for marketing (MWh)	392,357	400,000	415,000
Transmission lines (circuit miles):			
115 kV	60	60	60
138 kV	42	42	42
Total circuit miles	102	102	102
Revenues:			
Annual gross power revenues	$ 9,049	$ 9,247	$ 9,592
Prior year adjustments	0	0	0
Total power revenues	$ 9,049	$ 9,247	$ 9,592
Annual gross revenues:	$ 9,049	$ 9,247	$ 9,592

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
POWER MARKETED, WHEELED OR EXCHANGED BY PROJECT

ALASKA POWER ADMINISTRATION

Project	State	No. of Plants	Installed Capacity (kW)	FY 1989 Actual Power (GWH)	FY 1990 Estimated Power (GWH)	FY 1991 Estimated Power (GWH)
Power Marketed						
Eklutna	Alaska	1	30,000	173	164	164
Snettisham	Alaska	1	78,160	204	220	234
Total, Power Marketed		2	108,160	377	384	398
Power Wheeled and Exchanged						
Eklutna	Alaska	1	13	218	177	177

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
ALASKA POWER ADMINISTRATION
(Obligations in thousands of dollars)

OBJECT CLASS SUMMARY

Alaska Power Administration

Direct Funding:		FY 1989	FY 1990	FY 1991
11.1	Full-time permanent	$1,320	$1,372	$1,276
11.3	Other than full-time permanent	93	87	71
11.5	Other personnel compensation	55	57	43
11.9	Total personnel compensation	1,468	1,516	1,390
12.1	Civilian personnel benefits	347	398	390
21.0	Travel and transportation of persons	203	210	201
22.0	Transportation of things	105	119	83
23.1	Rental payments to GSA	97	94	119
23.3	Communications, utilities, and miscellaneous charges	64	68	76
24.0	Printing and reproduction	21	20	21
25.0	Other services	140	68	303
26.0	Supplies and materials	354	145	190
31.0	Equipment	480	496	460
32.0	Land & structures	0	0	0
Totals		$3,279	$3,134	$3,233

VOLUME 4

BONNEVILLE POWER ADMINISTRATION

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION FUND

PROPOSED APPROPRIATION LANGUAGE

Expenditures from the Bonneville Power Administration Fund, established pursuant to Public Law 93-454, are approved for [the Northeast Oregon Spring Chinook Facility and Galbraith Springs/Sherman Creek Hatcheries] 1/ the Yakima Basin Screen Facilities Phase II. 2/ Expenditures are also approved for official reception and representation expenses in an amount not to exceed $2,500.

During fiscal year [1990] 1991, no new direct loan obligations will be made.

Explanation of Changes

1/ Deletes language contained in Public Law 101-93 which had specific application to fiscal year 1990. The language is not required for the fiscal year 1991 budget.

2/ Proposed language provides authority to initiate second phase of major capital facility pursuant to the Pacific Northwest Power Planning and Conservation Act, Public Law 96-501.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

LEAD TABLE

Capital Investment Obligations	FY 1989	FY 1990	FY 1991 Base 1/	FY 1991	Program Change FY 1991 vs. Base Dollar	Percent
1 Energy Resources	40,232	41,600	41,600	17,000	-24,600	- 60%
2 Transmission System Development	55,436	165,100	165,100	157,200	-7,900	-5%
3 System Maintenance	48,363	52,300	52,300	50,200	-2,100	-4%
4 Fish and Wildlife	8,130	17,000	17,000	16,900	-100	-1%
5 Capital Equipment	7,356	8,400	8,400	7,000	-1,400	-17%
6 TOTAL CAPITAL INVESTMENTS	159,517	284,400	284,400	248,300	-36,100	-13%
7 Revenue Financed Cash Reserves 2/	0	-26,200	---	-78,200	-52,000	--
8 New Borrowing Authority (BA)	159,517	258,200	---	170,100	- 88,100	-35%
Expensed and Reimbursable Obligations						
9 Expensed	2,302,175	2,376,459	2,376,459	2,658,300	+281,841	+12%
10 Reimbursable	50,328	102,600	102,600	104,200	+1,700	+2%
11 TOTAL OBLIGATIONS [Lines 6 + 9 + 10]	2,512,020	2,763,459	2,763,459	3,010,900	+247,441	+9%
12 Capital Transfers (Cash)	325,972	343,200	343,200	176,300	-196,900	-57%
13 BPA TOTAL [Lines 11 + 12]	2,837,992	3,106,659	3,106,659	3,187,200	+80,541	+3%
14 FTE	3,310	3,230	3,230	3,130		

1/ BPA does not receive appropriations. All required wage increases, or increases in the Federal Telecommuncations System charges, standard level user charges, etc., are covered by revenue/Treasury borrowings deposited in the BPA Fund. Therefore, BPA has assumed that the FY 1991 Base is the same as FY 1990.

2/ To the extent borrowing authority is insufficient to cover capital obligations, BPA would be required to use cash reserves generated by revenues to finance these investments. In FY 1991 $45.6 million of this amount is from non-Federal participants in the Third AC Intertie.

CURRENT SERVICES
DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

BPAT SUMMARY

OBLIGATIONS/OUTLAYS

		FY 1989 Obligations	FY 1989 Outlays	FY 1990 Obligations	FY 1990 Outlays	FY 1991 Obligations	FY 1991 Outlays	FY 1992 Obligations	FY 1993 Obligations	FY 1994 Obligations	FY 1995 Obligations
1	Residential Exchange	789,303	790,165	890,900	897,500	928,500	928,500	1,080,400	1,107,300	1,160,600	1,215,800
2	System Operations	24,972	25,000	29,700	29,700	30,900	30,900	32,100	33,700	35,400	37,400
3	Power Marketing	41,214	40,850	50,800	50,800	51,100	51,100	53,700	55,500	58,000	61,200
4	Power Scheduling	105,376	101,876	32,800	32,800	34,600	34,600	35,900	38,700	40,900	43,100
5	Planning Council	7,373	7,570	7,500	7,500	7,500	7,500	7,300	7,400	7,400	7,400
6	Interest	171,309	169,863	164,000	164,000	345,800	345,800	347,900	341,900	339,000	322,900
7	Associated Project Costs	98,218	98,218	113,100	113,100	115,800	115,800	120,800	129,900	132,300	148,000
8	Energy Resources	971,458	979,963	995,659	1,000,259	1,018,500	1,026,100	1,064,700	1,096,900	1,151,000	1,194,800
9	Transmission System Development	82,896	86,531	176,400	106,600	169,000	147,300	194,800	190,000	196,600	197,900
10	System Maintenance	127,538	120,000	143,000	140,500	145,300	149,200	159,500	167,800	176,600	186,300
11	Fish & Wildlife	34,679	31,267	48,600	48,600	52,600	52,600	51,900	54,800	57,300	59,800
12	Capital Equipment	7,356	7,054	8,400	7,300	7,000	6,000	15,300	9,200	9,400	9,700
13	Reimbursable	50,328	50,328	102,600	102,600	104,300	104,300	116,700	122,300	128,700	135,300
14	TOTAL OBLIGATIONS/OUTLAYS	2,512,020	2,508,685	2,763,459	2,701,259	3,010,900	2,999,700	3,280,800	3,355,000	3,493,200	3,620,000

REVENUES AND REIMBURSABLES

		Accrued Rev/Reim	Cash Receipts	Accrued Rev/Reim	Cash Receipts	Accrued Rev/Reim	Cash Receipts	Accrued Rev/Reim	Accrued Rev/Reim	Accrued Rev/Reim	Accrued Rev/Reim
15	Revenues 1/	2,688,169	2,685,870	2,838,800	2,847,000	2,988,100	2,988,100	3,121,700	3,204,600	3,320,200	3,391,300
16	Reimbursements	48,220	49,587	102,600	102,600	104,300	104,300	116,700	122,300	128,700	135,300
17	TOTAL REVENUES/ REIMBURSEMENTS	2,736,389	2,735,457	2,941,400	2,949,600	3,092,400	3,092,400	3,238,400	3,326,900	3,448,900	3,526,600

NET OBLIGATIONS/OUTLAYS

18	NET OBLIGATIONS	(224,369)		(177,941)		(81,500)		22,400	28,100	44,300	93,400
19	NET OUTLAYS		(226,772)		(248,341)		(92,700)	22,400	28,100	44,300	93,400

1/ BPA's revenue estimates assume that a larger portion of the conservation program will be expensed in FY 1991 and subsequent years (FY 1991: $25,200; FY 1992: $37,000; FY 1993: $44,000; FY 1994: $53,600; FY 1995: $72,300). BPA revenue estimates also reflect payments from non-Federal participants in the Third AC Intertie (FY 1991: $45,600; FY 1992: $22,700; and FY 1993: $4,000).

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

BP-2

OBLIGATIONS/OUTLAYS

		FY 1989 Obligations	FY 1989 Outlays	FY 1990 Obligations	FY 1990 Outlays	FY 1991 Obligations	FY 1991 Outlays	FY 1992 Obligations	FY 1993 Obligations	FY 1994 Obligations	FY 1995 Obligations
	EXPENSED OBLIGATIONS/OUTLAYS										
1	Residential Exchange	789,303	790,165	890,900	897,500	928,500	928,500	1,060,400	1,107,300	1,160,600	1,215,600
2	System Operations	24,972	25,000	29,700	29,700	30,900	30,900	32,100	33,700	35,400	37,400
3	Power Marketing	41,214	40,850	50,800	50,800	51,100	51,100	53,700	55,500	58,000	61,200
4	Power Scheduling	105,376	101,876	32,800	32,800	34,600	34,600	35,900	38,700	40,900	43,100
5	Planning Council	7,373	7,570	7,500	7,500	7,500	7,500	7,300	7,400	7,400	7,400
6	Interest 1/ 2/	171,309	169,863	164,000	164,000	345,800	345,800	347,900	341,900	339,000	322,900
7	Associated Project Costs	98,218	98,218	113,100	113,100	115,800	115,800	120,800	129,900	132,300	149,000
8	Energy Resources 3/	931,226	930,536	954,059	958,659	1,001,500	1,009,100	1,040,100	1,067,600	1,115,300	1,148,400
9	Transmission System Development	27,460	26,360	11,300	11,300	11,800	11,800	12,100	11,600	12,000	12,400
10	System Maintenance	79,175	78,500	90,700	90,700	95,100	95,100	99,700	104,600	110,200	116,200
11	Fish & Wildlife	26,549	23,000	31,600	31,600	35,700	35,700	36,100	37,900	41,900	44,100
12	TOTAL EXPENSED OBLIGATIONS/OUTLAYS	2,302,175	2,291,938	2,376,459	2,387,659	2,658,300	2,665,900	2,846,100	2,936,100	3,053,000	3,155,700
13	TOTAL REIMBURSABLE OBLIGATIONS/OUTLAYS	50,328	50,328	102,600	102,600	104,300	104,300	116,700	122,300	128,700	135,300

1998

BP-3

		FY 1989 Obligations	FY 1989 Outlays	FY 1990 Obligations	FY 1990 Outlays	FY 1991 Obligations	FY 1991 Outlays	FY 1992 Obligations	FY 1993 Obligations	FY 1994 Obligations	FY 1995 Obligations
	CAPITAL INVESTMENTS										
14	Energy Resources 3/	40,232	49,427	41,600	41,600	17,000	17,000	24,600	29,300	35,700	48,200
15	Transmission System Development	55,436	60,171	165,100	95,300	157,200	135,500	182,500	178,400	184,600	185,500
16	System Maintenance	48,363	41,500	52,300	49,800	50,200	54,100	59,800	63,000	66,400	70,100
17	Fish & Wildlife	8,130	8,267	17,000	17,000	16,900	16,900	15,800	16,700	15,400	15,500
18	Capital Equipment	7,356	7,054	8,400	7,300	7,000	6,000	15,300	9,200	9,400	9,700
19	TOTAL CAPITAL INVESTMENTS	159,517	166,419	284,400	211,000	248,300	229,500	298,000	296,600	311,500	329,000
20	NEW BORROWING AUTHORITY	159,517		258,200		170,100		240,900	243,400	239,800	329,000
	REVENUE FINANCED										
21	CASH RESERVES 4/	0		26,200		78,200		57,100	53,200	71,700	0

		FY 1989 Payments	FY 1990 Payments	FY 1991 Payments	FY 1992 Payments	FY 1993 Payments	FY 1994 Payments	FY 1995 Payments
	CAPITAL TRANSFERS							
22	BPA Appropriated Interest 1/	56,408	58,800	--	--	--	--	--
23	Corps Appropriated Interest 1/	118,876	131,300	--	--	--	--	--
	Amortization:							
24	BPA Bonds	150,000	153,100	176,300	205,000	190,900	216,900	203,100
25	Appropriations	688	0	0	1,400	17,800	16,300	42,900
26	TOTAL CAPITAL TRANSFERS	325,972	343,200	176,300	206,400	208,700	233,200	246,000
			STAFFING					
27	FULL-TIME EQUIVALENT EMPLOYMENT (FTE)	3,310	3,230	3,130	3,130	3,130	3,130	3,130

1/ Starting in FY 1991, interest payments on BPA and Corps unpaid appropriations will be diplayed in the budget as an operating expense. This reflects BPA's longstanting practice and is consistent with accepted accounting treatment of interest payments.

2/ Starting in FY 1991, includes interest on construction funding for Corps of Engineers (Corps) fish bypass facilities at Corps dams in the Columbia River Basin, including Lower Monumental, Ice Harbor, and The Dalles dams as called for in the Fish Spill Memorandum of Agreement approved on April 10, 1989.

3/ Beginning in FY 1991, a substantial portion of BPA's capitalized conservation acquisitions will be expensed and financed with revenues (FY 1991: $25,200; FY 1992: $37,000; FY 1993: $44,000; FY 1994: $ 53,600; FY 1995: $72,300). The remainder, shown on line #14, is to be financed with new borrowing authority.

4/ To the extent borrowing authority is insufficient to cover capital obligations, BPA would use cash reserves (if available) generated by revenues from customers to finance these investments. Specifically, of the amounts shown here for FY 1991-93, $45,600, $22,700, and $4,000, respectively, are assumed to come from non-Federal participants in the 3rd AC Intertie offsetting BPA's need for borrowing authority by these amounts. (See also footnote 1/ on BP-1).

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

BP-4

BPA STATUS of BORROWING

	FY 1989			FY 1990			FY 1991		
	Obligations	Capital Expend. 1/,2/	Treasury Borrowing	Obligations	Capital Expend. 2/	Treasury Borrowing	Obligations	Capital Expend. 2/	Treasury Borrowing
Obligated Borrowing Authority - Start-of-Year	1,943,740	1,816,917	1,792,499	1,953,257	1,833,336	1,794,499	2,058,357	1,891,236	1,891,236
Plus: New Borrowing Authority/ Capital Expenditures	159,517	166,419		258,200	211,000		170,100	229,500	
Total Treasury Borrowing (Cash)			272,000			249,837			183,900
Refinancing of Notes & Bonds			(120,000)			0			0
Net New Treasury Borrowing			152,000			249,837			183,900
Less: Amortization of BPA Bonds	150,000	150,000	150,000	153,100	153,100	153,100	176,300	176,300	176,300
Net Increase/(Decrease) in Cumulative Treasury Borrowing	9,517	16,419	2,000	105,100	57,900	96,737	(6,200)	53,200	7,600
Obligated Borrowing Authority - End-of-Year	1,953,257	1,833,336	1,794,499	2,058,357	1,891,236	1,891,236	2,052,157	1,944,436	1,898,836
Unobligated Borrowing Authority - End-of-Year	1,796,743		1,955,501	1,691,643		1,858,764	1,697,843		1,851,164
Total Borrowing Authority	3,750,000		3,750,000	3,750,000		3,750,000	3,750,000		3,750,000

1/ Reflects BPA portion of Federal Columbia River Power System (FCRPS) final audited results.
2/ BPA's policy is to limit cumulative Treasury borrowing (net of amortization of BPA bonds) to the amount of estimated cumulative capital expenditures (net of amortization of BPA bonds).

BPA CASH FLOW
(dollars in thousands)

BP-5

BPA Cash From Current Year Operations	FY 1987 1/	FY 1988 1/	FY 1989 1/	FY 1990	FY 1991
1. Cash Provided by Operating Activities 2/	(30,897)	118,733	219,486	211,300 3/	338,700 3/
2. Amortization of BPA Bonds	(150,000)	(185,000)	(150,000)	(153,100)	(176,300)
3. Amortization of Appropriations	(1,331)	(9,535)	(2,197)	----	----
4. Current Year Cash Surplus/(Deficit)	(182,029)	(75,802)	67,289	58,200	162,400
BPA Cash Balance					
5. Beginning Cash Budget	87,264	239,688	119,248	172,098	269,135
6. Current Year Cash Surplus/(Deficit)	(182,029)	(75,802)	67,289	58,200	162,400
7. Cash Used for Investment Activities 4/	(200,548)	(178,338)	(186,419)	(211,000)	(229,500)
8. Cash From Borrowing	535,000	133,700	152,000	249,837 5/	183,900 5/
9. Ending Cash Balance	239,688	119,248	172,098	269,135 5/	385,935 5/
10. Deferred Borrowing Available 5/	(20,221)	24,418	38,837	0	0
11. Total Cash Reserves	219,467	143,666	210,935	269,135	385,935

1/ Reflects BPA portion of Federal Columbia River Power System (FCRPS) final audited results.
2/ Reflects funds from operations adjusted to a cash basis (net revenues + expenses not requiring cash + change in working capital). Does not include amortization of appropriations.
3/ Reflects revenue and expense estimates in BPA's Third Quarter Review (August 1989), except that $45,600 in FY 1991 has been added to reflect the Administration's assumptions concerning non-Federal participation in the Third AC Intertie.
4/ Reflects capital expenditures. Includes capitalized bond premiums and actual retirements.
5/ BPA's policy is to limit cumulative Treasury borrowing (net of amortization of BPA bonds) to the amount of estimated cumulative capital expenditures (net of amortization of BPA bonds). "Deferred Borrowing Available" (line 10) reflects the amount of capital expenditures against which BPA has not borrowed. Actual Treasury borrowing (line 8) and ending cash balances (line 9) in FY 1990 and FY 1991 may be lower depending on revenues, Treasury interest rates, and other cash management factors.

DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

TREASURY PAYMENTS - V
Impact of Repayment Proposal
($ in millions)

STRAIGHT LINE — 50 YEARS; AAA BOND INTEREST RATES

		FY 1990	FY 1995	FY 2000			FY 2005			FY 2010			FY 2015			FY 2020		
		Current Services	Current Services	Current Services	Repayt Proposal	Difference	Current Services	Repayt Proposal	Difference	Current Services	Repayt Proposal	Difference	Current Services	Repayt Proposal	Difference	Current Services	Repayt Proposal	Difference
A.	INTEREST TREATED AS OBLIGATIONS & OUTLAYS																	
1	Bureau Interest	a/	39.1	39.0	32.4	96.5	64.4	34.7	66.5	40.8	38.8	59.6	57.8	36.0	89.5	54.0	38.0	67.1	91.1
2	Irrigation Interest	a/	0.0	0.0	0.0	64.2	64.2	0.0	62.5	62.5	0.0	60.8	60.8	0.0	59.2	59.2	0.0	58.3	58.3
3	Total Interest Treated as Obligations & Outlays		39.1	39.0	32.4	160.8	127.6	34.7	129.0	103.3	38.8	134.4	118.6	36.0	148.7	113.7	38.0	148.4	150.4
B.	ASSOC. PROJECT COST																		
4	Bureau Amortization		0.2	0.0	0.0	39.5	39.5	0.0	31.6	31.6	0.0	33.8	33.8	0.0	34.5	34.5	0.0	39.0	33.4
5	Irrigation Amortization		0.0	0.0	0.0	33.8	33.8	0.0	33.0	33.0	0.0	34.0	34.0	0.0	34.2	34.2	0.0	34.3	34.3
6	Bureau O&M		35.9	34.9	36.1	36.1	0.0	36.1	36.1	0.0	40.7	40.7	0.0	36.2	36.2	0.0	46.0	46.0	0.0
7	Corps O&M		64.8	66.2	66.5	66.5	0.0	72.4	72.4	0.0	76.9	76.9	0.0	80.0	80.0	0.0	84.4	84.4	0.0
8	LSRCP O&M		7.9	9.0	11.2	11.2	0.0	12.3	12.3	0.0	13.2	13.2	0.0	14.1	14.1	0.0	15.0	15.0	0.0
9	Total Assoc. Project Costs		95.2	110.1	113.8	189.1	53.3	130.8	179.3	58.5	130.9	187.7	57.8	152.3	191.0	58.7	148.0	188.9	67.9
C.	CAPITAL TRANSFERS																		
	Interest Treated as Capital Transfers																		
10	BPA Appropriations	b/	59.4	59.6	56.6	147.6	90.2	58.5	139.4	80.9	56.6	127.3	69.5	58.0	119.4	59.6	58.0	102.1	43.3
11	Corps Appropriations	b/	119.9	121.5	122.5	360.4	238.0	134.7	390.7	256.0	139.0	380.9	241.9	139.9	388.9	239.0	132.9	347.7	214.8
12	LSRCP Appropriations	b/	0.0	0.0	10.0	15.5	4.6	12.0	16.8	4.8	12.0	16.2	4.2	12.0	15.5	3.5	12.9	16.5	3.6
13	BPA Bond Interest (NET)		144.7	134.0	121.2	91.1	(30.1)	117.7	100.4	(17.3)	107.3	113.4	6.1	101.3	121.3	20.0	93.3	134.6	91.3
14	AFUDC	b/	12.4	10.3	14.8	14.8	0.0	14.3	14.3	0.0	17.5	17.5	0.0	20.0	20.0	0.0	22.0	22.0	0.0
	Amortization																		
15	BPA Bonds		100.0	100.1	176.3	33.7	(102.6)	305.0	0.0	(305.0)	100.0	0.0	(100.0)	219.0	4.0	(212.0)	203.1	1.0	(201.2)
16	Corps		0.7	0.0	0.0	147.5	147.5	1.6	148.3	146.8	17.5	149.5	131.7	18.3	148.7	130.4	42.9	143.4	100.5
17	LSRCP		0.0	0.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0
18	BPA Appropriations		0.0	0.0	0.0	79.4	79.4	0.0	123.0	123.0	0.0	133.0	133.0	0.0	136.2	136.2	0.0	144.8	144.8
19	Total Capital Transfers		483.1	467.5	504.5	914.9	406.5	583.9	927.4	393.5	532.3	919.7	387.4	558.2	921.7	363.5	568.9	918.4	349.9
20	TOTAL TREASURY PAYMENTS (LINES 3 + 11 + 21)		606.4	630.6	652.7	1,243.1	590.4	689.4	1,261.7	572.3	668.0	1,261.8	563.8	734.5	1,262.4	537.9	740.8	1,254.7	517.9
21	NET OUTLAYS		(236.8)	(248.3)	(92.7)	(362.2)	(469.5)	22.4	(371.1)	(393.5)	28.1	(339.3)	(367.4)	44.3	(321.2)	(365.5)	93.4	(267.3)	(360.8)

(See Footnotes on Following Page)

STRAIGHT LINE----50 YEARS; AAA BOND INTEREST RATES
FOOTNOTE EXPLANATIONS

NOTE: For purposes of this table, interest on BPA bonds and Corps of Engineers unpaid appropriations is treated as a Capital Transfer, rather than an operating expense. Implementation of this proposal would require the reclassification of some interest payments as operating expense. This reflects BPA's longstanding practice and is consistent with accepted accounting treatment of interest payments.

1/ Legislation will be submitted to change BPA's repayment practice beginning in FY 1991 to convert to a fixed 50-year straight-line repayment method of amortization of the Federal appropriated investment including irrigation assistance, and to pay interest on the unpaid balance of appropriations and outstanding irrigation assistance computed at AAA utility industry interest rates, adjusted to reflect current market rates.

2/ This interest cost is capitalized and included in BPA's Transmission System Development program and financed through the sale of bonds.

3/ Starting in FY 1991, interest payments on BPA, LSRCP, and Corps unpaid appropriations will be displayed in the budget as an operating expense. This reflects BPA's longstanding practice and is consistent with accepted accounting treatment of interest payments.

4/ Interest expense on appropriations and irrigation assistance is computed at 9.75% for "Repayment Proposal" column, which reflects the average 1991-1995 projected AAA bond rates reported by Data Resources, Inc., U.S. long-term review, Winter 1988-1989. Interest rate projections for individual years are as follows: FY 1991, 9.92%; FY 1992, 10.21%; FY 1993, 9.81%; FY 1994, 9.46%; FY 1995, 9.33%.

5/ Includes interest on construction funding for Corps fish bypass facilities at Corps dams in the Columbia River Basin, including Lower Monumental, Ice Harbor, and The Dalles dams, as called for in the Fish Spill Memorandum of Agreement approved on April 10, 1989.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

SUMMARY OF CHANGES IN CAPITAL COMMITMENTS AND BORROWING AUTHORITY, FY 1990 TO FY 1991

FY 1990 New Borrowing Authority	258,200
Revenue Financed Cash Reserves Required (if Available) to Fund Capital Investments	+26,200
FY 1990 Capital Investments	284,400
Energy Resources	
- Beginning in FY 1991, a substantial portion of BPA's capitalized conservation acquisitions will be expensed	-24,600
Transmission System Development	
- Reduced obligations for Third AC System, in accordance with construction schedule	-21,200
- Increased funding for Longview System Reinforcement	+9,900
- Increased funding for the North Puget Reinforcement	+3,700
- Increased AFUDC due to higher construction work in progress	+4,500
- Miscellaneous changes	-4,800
System Maintenance	
- Completion of oscillograph and multipoint recorder replacements	-500
- Completion of various high density multiplex channel replacements	-500
- Decreased transformer replacements	-400
- Completion of Celilo roof replacements and completion of major contract work for the Olympia headquarters complex	-1,800
- Increased funding for additional maintenance tools and equipment replacement	+1,100
Fish and Wildlife	
- Completion of Galbraith Springs/Sherman Creek Hatchery Project	-4,300
- Increased construction activity for Northeast Oregon Spring Chinook Facility	+4,200
Capital Equipment	
- Completion of major ADP equipment purchases and other minor reductions	-1,400
FY 1991 Capital Investments	248,300
Represents $45.6 million in payments from non-Federal participants for their Share of the Third AC, and $32.6 million in Revenue Financed Cash Reserves Required (if available) to Fund Capital Investments	-78,200
FY 1991 New Borrowing Authority	170,100

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION

BUDGET PREFACE AND PROGRAM OVERVIEW

Bonneville Power Administration (BPA) is one of five Federal power marketing administrations. It serves a 300,000-square-mile area including Oregon, Washington, Idaho, Western Montana, and parts of Northern California, Nevada, Utah, and Wyoming. BPA markets about one-half of the electric energy produced in the Pacific Northwest and provides about four-fifths of the region's electric power transmission capacity.

BPA's program conforms to the mandates of the Bonneville Project Act of 1937, the Federal Columbia River Transmission System Act of 1974 (Transmission Act) and the requirements of the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Pacific Northwest Power Act).

BPA was created in 1937 to market and transmit the power produced by Bonneville Dam on the Columbia River. Since then, Congress has directed BPA to sell at wholesale the power produced at a total of 30 Federal dams in the Pacific Northwest, and to acquire non-Federal power and conservation resources as needed to meet the load growth of BPA's customer utilities.

The Transmission Act provided BPA authority to use its revenues to fund all programs directly, allowed BPA to sell bonds to the U.S. Treasury to finance the region's high voltage transmission requirements, and placed BPA under provisions of the Government Corporation Control Act.

The 1980 Pacific Northwest Power Act expanded BPA's utility obligations and increased its authority to sell bonds to the Treasury up to a cumulative outstanding total of $3.75 billion. Such bonds are used to finance construction of long-lived transmission system improvements, conservation and other resources which are required to meet the Administrator's obligations to meet loads while minimizing overall system costs, and to carry out fish and wildlife capital improvements which implement the Northwest Power Planning Council's Fish and Wildlife Program. The Act also created the Northwest Power Planning Council, and required regional energy plans and programs.

BPA is obligated to serve the electric power loads placed on it by utilities in the region. During FY 1989, with continued strong demand from smelters and a strong regional economy, the energy surplus of the 1980's effectively disappeared. Continued load growth in the Puget Sound area has become a source of particular concern as transmission capacity begins to constrain system reliability. The loss of transmission and generation capabilities during the "deep freeze" of February 1989 strained the capability of the region's power system. With continued load growth, another cold snap could result in serious effects to the system.

In addition, the expiration of agreements implementing the Canadian Treaty will require return of one-half of the associated downstream benefits within 5 years. On the demand side, BPA's power sales contracts expire in 2001. The terms of service to be offered for subsequent contracts will be influenced by resources expected to be available, including both potential new Canadian resources to replace the Canadian Treaty benefits, and resources resulting from agreements on coordinated system operation (the Coordination Agreement), also being renegotiated. Extensive analytical efforts will be required to support development of contract principles for new power sales contracts. Because of their major impact on BPA's revenues and its power needs, DSI contract principles must precede major efforts on other power sales contract negotiations. These efforts are required to support negotiations on the Canadian Treaty, the Coordination Agreement, power sales contracts, and resource acquisitions.

Extra-regional sources offer one attractive means of meeting future resource needs, and negotiations with both Canada and domestic Southwest and West Coast utilities are exploring such possibilities. BPA is also working closely with utilities and with the Corps of Engineers, the Bureau of Reclamation, and British Columbia Hydro to maximize potential benefits from increased coordination of power systems, production and operating efficiencies, and exchanges of power.

The FY 1991 Congressional Budget assumes the continued availability of borrowing authority for the Third AC system upgrades for FY's 1989 and 1990. For FY 1991 and subsequent years, however, the budget reflects the Administration's assumption that about two-thirds of the estimated construction, ownership, and operation and maintenance costs for the Third AC Intertie System upgrades would be financed by non-Federal participants. When completed, the Third AC will increase intertie capability by 1,600 MW. BPA has recently signed a memorandum of understanding with the utilities involved in the Third AC Intertie, which covers permits, licenses, environmental approval, and other physical requirements including construction. This memorandum of understanding does not preclude alternative forms of participation by non-Federal utilities. The next step will be an interconnection agreement, which defines access rights, and must be completed before construction can begin.

BPA receives no appropriations. Its annual operating expenses are funded by revenues received from sales of power and associated services. BPA's revenues fluctuate in response to market prices for fuels and commodity metals, and to weather conditions affecting streamflows in the Columbia River system.

Financial vulnerability, resulting from BPA's high levels of fixed costs and increased periodically by water, resource and market conditions, continues to be a matter of concern for BPA.

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Financial vulnerability, resulting from BPA's high levels of fixed costs and increased periodically by water, resource and market conditions, continues to be a matter of concern for BPA.

BPA's FY 1991 budget includes reductions in BPA's planned borrowing as a result of the Administration's directions to change funding assumptions for the Third AC Intertie, and to expense a substantial portion of formerly capitalized conservation activities. The budget assumes that this part of the conservation program will now be included as an Operating Expense and funded through revenues. The budget also assumes that there will be legislation proposed to change the U.S. Treasury repayment practices of the power marketing authorities, including BPA. These increased expenses are not reflected in the base on which BPA's rates for FY 1991 were established. Recent successful refinancing of much of BPA's high interest debt on the Washington Public Power Supply System would offset only a portion of the increased expenses which would result from directives changing proposed expense levels in BPA's FY 1991 budget.

Through FY 1989, BPA had returned $8.1 billion to the U.S. Treasury in interest, amortization, and repayment of Federal power generation operation, maintenance, and construction costs. At the end of FY 1989, the unamortized Federal investment in the Federal Columbia River Power System was approximately $9.1 billion. During FY 1991, BPA plans to pay the Treasury $652.7 million, $176.3 million of which is to repay principal. Budget obligations for BPA capital programs in FY 1991 are estimated to be $248.3 million, of which $170.1 million is new borrowing authority.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION

SYSTEM STATISTICS

	FY 1989	FY 1990	FY 1991
Capacity Resources (MW)			
System Hydro (9 USBR & 21 USCE projects)	21,507	21,434	21,377
Large Thermal	1,425	1,425	1,425
TOTAL CAPACITY RESOURCES	22,932	22,859	22,802
Energy Resources (MWH)			
Energy generated for BPA:			
Federal Firm Hydro	65,700,000	65,700,000	65,700,000
Secondary Hydro (non-firm)	6,260,400	10,000,000	20,000,000
Thermal			
WNP-2	5,872,700	6,228,000	6,228,000
Hanford 1/	(2,000)	(2,000)	(2,000)
Centralia Thermal Project 2/ 3/	0	0	0
Trojan Nuclear Plant 2/	1,573,200	2,050,000	2,050,000
Other 4/	1,373,300	1,300,000	1,300,000
SUBTOTAL	80,777,600	85,276,000	95,276,000
Energy Acquired or Received For Delivery by BPA (MWH)			
Wheeling (non-Federal)	44,017,000	49,346,000	51,320,000
Purchased	4,181,000	1,000,000	200,000
Interchange 5/	13,273,600	14,000,000	14,000,000
SUBTOTAL	61,471,600	64,346,000	65,520,000
TOTAL ENERGY REC'D (Trans. Sys. Load)	142,249,200	149,622,000	160,796,000

1/ Hanford has not been generating since January 1987. Approximately 2000 MWH is needed for station service.
2/ Federal share only.
3/ Centralia share being scheduled by the participant.
4/ Includes, but not limited to, public agency shares of Priest Rapids, Wanapum, Wells, and Cogeneration.
5/ Includes, but not limited to, Pacific Northwest Coordination Agreement transactions, storage, uncontrolled, peaking, and reserved energy.

DEPARTMENT OF ENERGY
FY 1991 OMB BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION

(continued)

SYSTEM STATISTICS

	FY 1989	FY 1990	FY 1991
Substations			
Number of energized substations	387	387	387
kVA capacity	66,091,130	66,391,130	66,501,130
Transmission lines energized			
Total circuit-miles	14,727	14,732	14,732
Investments ($ million) 1/			
Transmission facilities (BPA)	3,747	3,837	3,978
USCE & USBR hydroelec. facil.	5,550	5,604	5,685
Fish and Wildlife (BPA)	31	42	55
Conservation	695	735	779
TOTAL	10,023	10,218	10,497

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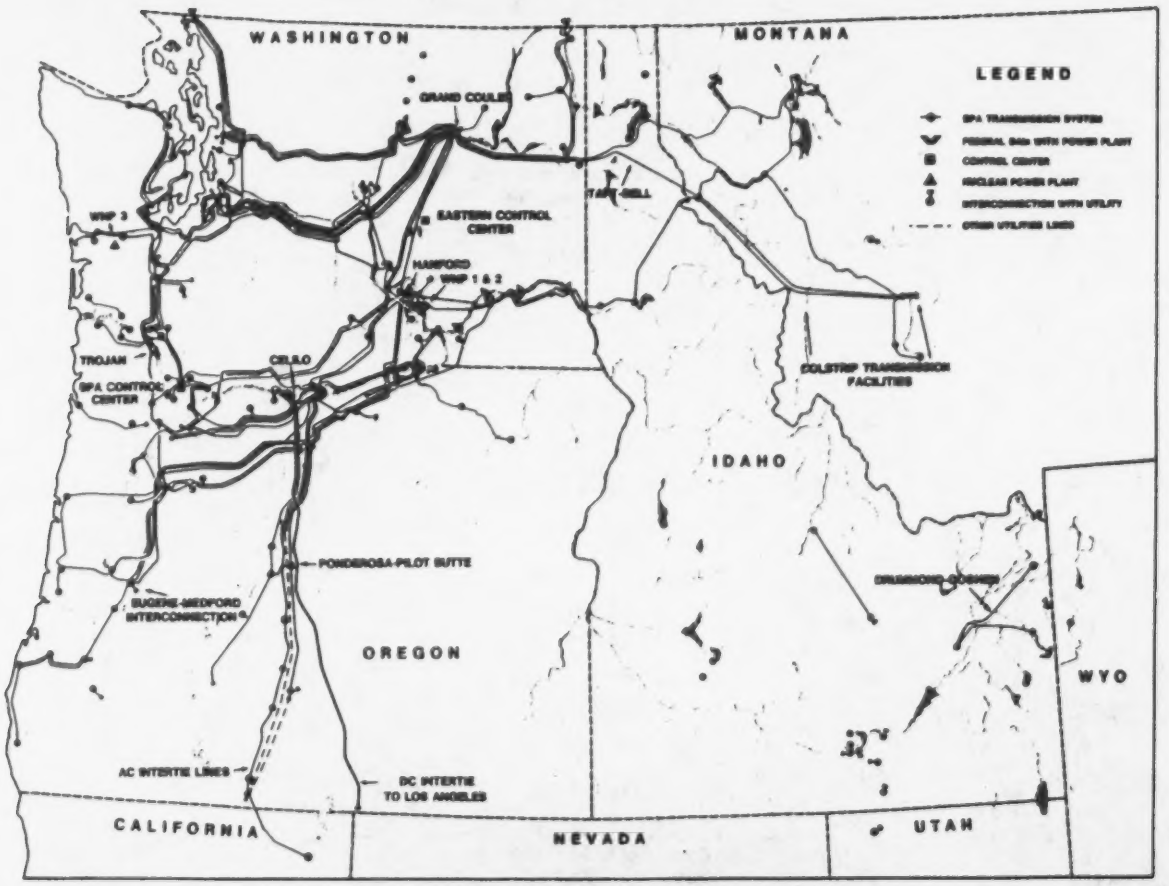
1/ Investment estimates include long-term debt and Federal appropriations. CWIP (Construction Work-in-Progress) is not included. This treatment is consistent with other Congressional presentations.



BPA TRANSMISSION SYSTEM 53

DEPARTMENT OF ENERGY
FY 1991 OMB BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION

FINANCIAL PERFORMANCE INDICATORS

In March 1988, the Office of Management and Budget requested that the Department of Energy (DOE) prepare a study of the financial management practices of the five Power Marketing Administrations (PMA). Among several financial practices addressed in the study, 20 financial performance indicators were analyzed, four of which were recommended as useful information for evaluating PMA financial performance. These performance indicators are best suited for use as management tools to monitor and track financial performance against internally developed financial plans.

The study recommended that each PMA report a 5-year historical summary of the four most useful indicators as part of DOE's annual budget. These financial performance indicators include:

* Debt service coverage ratio
* Cumulative principal payments as a percent of total Federal investment
* Percent variance of actual from planned annual principal payments
* Net cash flow to the U.S. Treasury

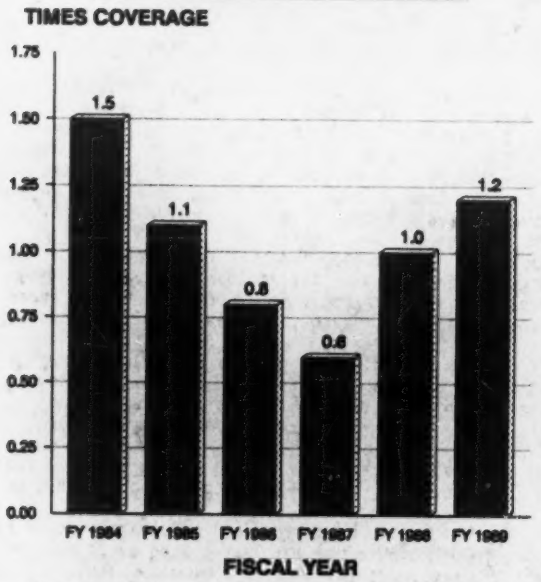
The debt service coverage ratio is viewed as the most useful of the indicators studied as it measures the adequacy of annual cash flow to cover annual payments of both principal and interest, a primary concern of PMAs. However, the appropriate level of debt service coverage for one PMA may not be suitable for another PMA or its individual systems, depending on the unique circumstances and characteristics of each.

The indicator measuring cumulative principal payments as a percent of total Federal investment provides a useful measure of the progress toward repayment. The indicator measuring percent variance of actual from planned annual principal payments provides information with respect to the variability in planned versus actual financial performance. The measure of net cash flow to the U.S. Treasury takes into consideration all cash inflows and outflows to and from the U.S. Treasury for Bonneville. A complete description of all of the financial performance indicators analyzed is included in "A Study of Power Marketing Administration Selected Financial Management Practices" (October 1988 DOE/BP-1096).

The following graphs present an updated 6-year historical record of each of four recommended financial performance indicators for the period FY 1984 through FY 1989.

Bonneville Power Administration

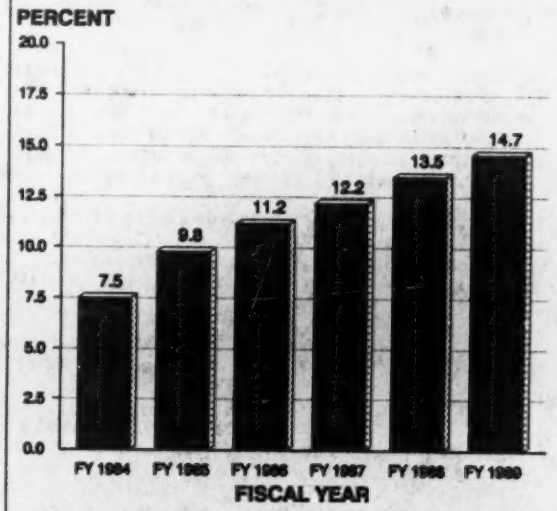
DEBT SERVICE COVERAGE RATIO



Measures annual revenues in excess of annual operating expenses requiring cash as an indicator of BPA's ability to cover annual debt service payments. A ratio of 1.0 indicates that revenues generated during the year were just sufficient to cover annual principal and interest payments on outstanding debt, in addition to meeting all other cash expenses.

Bonneville Power Administration

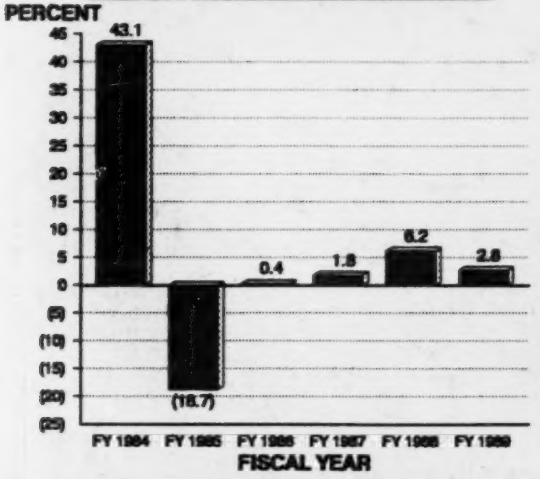
CUMULATIVE PRINCIPAL PAYMENTS AS A PERCENT OF TOTAL FEDERAL INVESTMENT



Measures cumulative progress toward repayment of the Federal investment in the Federal Columbia River Power System. During a period of capital expansion, this indicator would tend to decrease, whereas increases in cumulative payments over time would be expected for a mature system. Throughout the period FY 1984 - FY 1989, BPA has steadily made progress toward repayment of the Federal investment.

Bonneville Power Administration

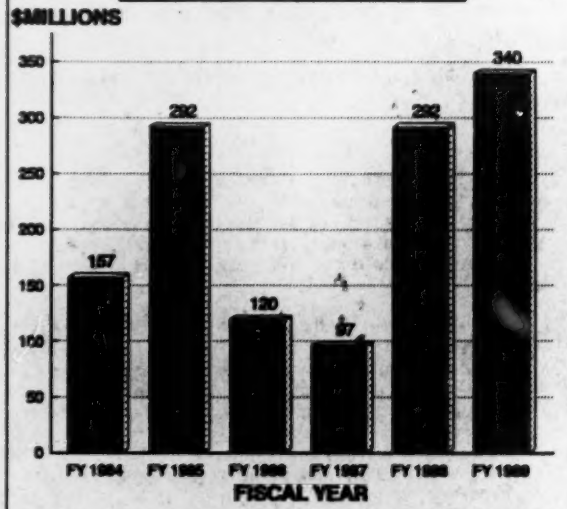
PERCENT VARIANCE OF ACTUAL FROM PLANNED IN PRINCIPAL PAYMENTS



Measures the variance between actual and planned annual principal payments to the U.S. Treasury. The higher the percentage, the greater the actual payment than planned. Planned financial data is based on data derived from the relevant studies performed for establishing rates for each of the fiscal years. Due to repayment of the entire outstanding deferral in FY 1984, BPA's actual payment in FY 1984 exceeded planned amounts by 43.1%, resulting in actual payments lower than planned in FY 1985. However, over the two-year period FY 1984-1985 actual amortization payments exceeded planned by 2.6%. Over the six-year period FY 1984-1989, BPA paid more amortization to the Treasury than it had planned.

Bonneville Power Administration

NET CASH FLOW TO THE TREASURY



Measures the actual net cash flow (the sum of all inflows less all outflows) to the U.S. Treasury. This indicator focuses on cash flows as opposed to accrual accounting results attributable to the continuing operations of the Federal Columbia River Power System. Because of its cash nature, this indicator may vary from year to year depending on actual financial performance as well as the magnitude of capital expenditures. In each of the FY's 1984-1989, BPA net cash flows to the Treasury have been positive despite net losses (annual expenses in excess of annual revenues) in FY 1986 and FY 1987.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION

OVERVIEW OF KEY ACTIVITY SUMMARIES

BPA's Key Activity Summaries are divided into two sections, reflecting their different economic character and sources of funding.

The first section, Capital Programs, includes BPA's five capital budget programs providing for capital investments in electric utility and general plant associated with the Federal Columbia River Power System's (FCRPS) transmission system, general plant, energy resources, and capital investments in fish and wildlife. These five programs will require budget obligations of $248.3 million in FY 1991, which will be financed by cash reserves and the proceeds of Treasury borrowings pursuant to $170.1 million of new borrowing authority being proposed in FY 1991.

BPA's second section of Key Activity Summaries, Annual Operating Expenses, includes BPA's 12 operating programs funded directly out of the BPA Fund from power sales and transmission services revenues, BPA reimbursable activities funded by benefitting entities, and BPA capital transfers to the treasury to make cash payment for certain FCRPS costs. For FY 1991, BPA's revenue funded programs will require budget obligations of $2,658.3 million. Reimbursable activities are budgeted at $104.3 million, and capital transfer requirements are $176.3 million for FY 1991.

Budget requirements of the Capital Programs are tabulated on page 3 and expenses are shown on the back of page 2 of this budget proposal. Since BPA has four budget programs with both capital and expense components (Transmission System Development, System Maintenance, Energy Resources, and Fish and Wildlife), the capital and expense components of these four programs must be combined for total program requirements. The total program requirements of all BPA programs are shown on page 2, and will require budget obligations of $3,010.9 million in FY 1991.

PROGRAM STRUCTURE CHANGES

Some changes in program structure have been made between this budget and previous documents. Those changes are explained below:

* Energy Resources: A portion of the capital Energy Resources Program has been transferred to the Energy Resources Expense Program, with the assumption that, beginning in 1991, some conservation activities will

no longer be capitalized and financed with borrowing under the Pacific Northwest Power Act. Consequently, a substantial portion of BPA's FY 1991-95 capital conservation estimates have been displayed as expenses.

- Interest: Beginning in FY 1991, the interest on Corps of Engineers and BPA appropriations are moved from the Capital Transfer category to the Interest program, where they are displayed as obligations and outlays. This change results in a one-for-one increase in BPA net outlays.

  Starting in FY 1989, interest expense on the Bureau of Reclamation (Bureau) appropriations has been moved from the Associated Project Cost Program to the Interest Program. (Irrigation interest would be shown here as well, if any were scheduled in the fiscal years contained in this budget.) Since Bureau interest was already treated as an obligation and outlay, this display change has no effect on net outlays. The name of the receiving program has been changed from BPA Bond Interest to Interest, reflecting its expanded nature.

A graphic display of these changes is shown below.

CROSSWALK OF
PROGRAM STRUCTURE CHANGES 1/

LOCATION OF ELEMENT IN OLD PROGRAM STRUCTURE (as in FY 1990 Congressional Budget)		LOCATION OF ELEMENT IN NEW PROGRAM STRUCTURE (for FY 1991 Congressional Budget)
ENERGY RESOURCES - Capital 60 percent (FY 1991-95)	→	ENERGY RESOURCES - Expense
CAPITAL TRANSFER (FY 1991-95) BPA Appropriation Interest Corps Appropriation Interest	→	INTEREST
ASSOCIATED PROJECT COST Bureau Interest (FY 1989-95)	→	INTEREST

1/ Only the program elements affected by structure changes are listed on this table.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
BORROWING AUTHORITY
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Energy Resources - Capital

The Pacific Northwest Electric Power Planning and Conservation Act of 1980 requires BPA to treat electric energy conservation as the region's highest priority resource in planning to meet the Administrator's load-serving obligations. The Energy Resources Program provides for acquisition of cost-effective conservation measures for existing homes, and provides incentives to increase efficiencies for new residential and commercial construction, industrial technology, commercial equipment, and residential appliances. The energy produced by the measures is based on the acquisition component in each of the program areas and energy use impacts from pilot or demonstration programs.

The FY 1991 Energy Resources Capital Program has been revised to conform to prevailing utility industry practice and FERC regulations which require that conservation related promotional, advertising and overhead costs will be revenue financed. This would allow BPA to continue to capitalize certain investments as assets even though these assets would not be owned or controlled by BPA.

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II. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Residential Programs	22,533	24,300	11,000	-55
Commercial Programs	4,706	12,800	4,200	-67
Industrial Programs	1,245	4,500	1,800	-60
Bond Premium	11,748	0	0	
TOTAL	40,232	41,600	17,000	-59

III. Activity Description: Energy Resources - Capital

Program Activity	FY 1989	FY 1990	FY 1991
Residential	Residential sector programs acquired 4.2 AMW of energy savings. This was accomplished by continuing incentive payments for weatherization of existing homes. Incentive payments for construction of energy efficient new homes that meet the NW Planning Council's Model Conservation Standards (MCS) were also continued. ($22,533)	Residential sector programs will acquire 3.4 AMW during FY 1990. This will be accomplished by continuing incentive payments for weatherization of existing homes. Incentives for construction of energy efficient new homes that meet the MCS will continue. ($24,300)	Residential sector programs will acquire 1.4 AMW during FY 1991. This will be accomplished by continuing incentive payments for weatherization of existing homes. Continuing are the NW Energy Code and Super Good Cents programs. Reduction reflects program conformance with prevailing utility practice. ($11,000)
Commercial	Commercial programs increased the energy efficiency of commercial facilities. The Commercial Incentive Pilot Program (CIPP) is a 3 year project to test response to incentives that subsidize investments in energy efficient measures. The Institutional Buildings Program (IBP) Follow-on is a 2 year effort to ensure that energy conservation measures installed previously are being properly maintained and operated, and that appropriate savings are realized. The Energy Smart Design Program, begun in FY 1988, is a 3 year effort to encourage energy efficient pre-design planning for new commercial buildings to support adoption of commercial Model Conservation Standards (MCS). These programs developed capability to acquire savings in the future when needed. CIPP produced 2.2 AMW of electric energy savings in FY 1989. ($4,706)	Commercial programs will increase the energy efficiency of commercial facilities. BPA will continue the CIPP, the IBP Follow-on, and the Energy Smart Design programs. These programs will develop flexible capability to acquire savings in the future when needed. The CIPP will produce 3.0 AMW of electric energy savings in FY 1990. The increase in funding is in the Energy Smart Design Program. ($12,800)	Commercial programs increase the energy efficiency of commercial facilities. BPA will continue the Energy Smart Design program and will initiate the Acquisition Incentives program. These programs develop capability to acquire savings in the future. Reduction reflects program conformance with prevailing utility practice. ($4,200)

III. Activity Description: Energy Resources - Capital (continued)

Program Activity	FY 1989	FY 1990	FY 1991
Industrial	Industrial programs continued to acquire site-specific energy efficiency projects in industry, and began to develop the capability, through the Energy Savings Plan, to acquire savings in the future when needed. Contracts obligated in FY 1988 produced savings in FY 1989 and 1990 via the Sponsor-Designed Program and Energy Savings Plan. The agricultural program continued to increase the energy efficiency of irrigation by changeover to low pressure systems and efficient water scheduling. These activities produced 11.6 AMW of savings in FY 1989. Contracts obligated in in FY 1989 and FY 1990. ($1,245)	Industrial programs will continue to acquire site-specific energy efficiency projects in industry, and emphasize the development of capability to acquire savings in the future when needed through the Energy Savings Plan. The agricultural programs will continue. These activities will produce 11.2 AMW of savings in FY 1990. The increase in costs over FY 1989 is due to the Energy Savings Program. Contracts obligated in FY 1988 are producing energy savings in FY 1989 and FY 1990. ($4,500)	Industrial programs will continue to acquire site-specific energy efficiency projects in industry, and emphasize the development of capability to acquire savings in the future when needed through the Energy Savings Plan. The agricultural programs will continue. Efforts to target lost opportunity resources in the Energy Savings Plan and successor programs will be initiated. Reduction reflects program conformance with prevailing utility practice. ($1,800)
Bond Premium	A bond call premium was paid to the U.S. Treasury to refinance a high interest (13.05 percent) conservation bond prior to its maturity date. ($11,748)	Refinancing of conservation bonds is not forecasted.	Refinancing of conservation bonds is not forecasted.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
BORROWING AUTHORITY/REVENUE FUNDED
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Transmission System Development - Capital

The Transmission System Development Program provides for planning, design, and construction of transmission line, substation and control system additions and enhancements for the transmission system of the Federal Columbia River Power System (FCRPS) in the Pacific Northwest. System replacements are included as capital investments in the System Maintenance Program.

The major focus of the FY 1991 Transmission System Development Program is to provide facilities required to satisfy system reliability in light of incremental load growth at a number of locations. In addition, transmission facilities previously proposed are included to serve a significant new load in the Port Angeles area of western Washington State by FY 1993. Obligational authority to continue work on the Alvey-Meridian transmission line in southern Oregon and the Third AC Intertie between the Pacific Northwest and the Pacific Southwest is included in all fiscal years. Work on the Alvey-Meridian transmission line and the Third AC Intertie is scheduled recognizing uncertainties in obtaining key agreements between participating organizations. The FY 1991 Congressional Budget assumes the continued availability of borrowing authority for the Third AC system upgrades. For FY 1991 and subsequent years, however, the budget assumes about two-thirds of the estimated construction, ownership, and operation and maintenance costs for the Third AC Intertie System upgrades would be financed by non-Federal participants.

During FY 1991, BPA plans to continue engineering and construction on substation and line facilities currently underway. Although no new substations or line facilities are planned for energization for FY 1991, a variety of upgrades and additions to existing substation and line facilities are scheduled for energization in FY 1991.

II. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Main Grid	29,112	121,000	109,200	-10
Area and Customer Service	12,378	10,100	7,200	-29
Preliminary Engineering and Stock Material	4,777	2,600	3,400	+31
Misc. Line & Substation Additions	2,085	6,500	7,000	+8
System Controls	15,959	13,800	14,800	+7
Miscellaneous Completions	-1,062	800	800	0
AFUDC	0	10,300	14,800	+44
Capital to Expense Adjustments	-7,813	0	0	0
TOTAL	55,436	165,100	157,200	-5

III. Activity Description: Transmission System Development - Capital

Program Activity	FY 1989	FY 1990	FY 1991
Main Grid	Complete work on the DC Terminal Expansion. Begin design activities for the Alvey-Meridian and Third AC Intertie facilities. Design and construct various system reactive additions. ($29,112)	Continue design activities and begin material procurement and construction activities for the Alvey-Meridian and Third AC Intertie facilities. Begin design and procurement for Port Angeles system additions. Design and construct various system reactive additions. ($121,000)	Continue construction activities for the Alvey-Meridian and the Third AC Intertie facilities. Of the $67,600 to be obligated for these facilities in FY 1991, $45,600 is assumed to come from non-Federal participants in the Third AC. Continue construction of Port Angeles System additions. Begin design and material procurement for Bellingham Area Reinforcement. Begin design and material procurement activities for SW Portland, Olympic Peninsula, Shelton-Fairmount, and Longview System Reinforcements. ($109,200)

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III. Activity Description: Transmission System Development - Capital (continued)

Area and Customer Service	Continue construction of LaPine area reinforcement. Begin engineering for Shelton reinforcement. Complete design and construction of Snohomish-Beverly Park line. Design and construct various customer service additions. Design and procure material for Toledo Transformer Reinforcement. ($12,378)	Complete construction of LaPine area reinforcement. Begin construction of Shelton Reinforcement. Begin design and environmental work for East Lewis County support. Design and construct various customer service additions. ($10,100)	Continue design and environmental work for East Lewis County support. Begin design and material procurement for Sno-King Transformer addition. Complete construction of Shelton reinforcement. ($7,200)
Preliminary Engineering and Stock Material	Perform preliminary engineering including planning, reconnaissance, survey, stock material and design for main grid, customer service system controls, miscellaneous line and substation additions. ($4,777)	Perform preliminary engineering including planning, reconnaissance survey and design for main grid, customer service, system controls, miscellaneous line and substation additions. ($2,600)	Perform preliminary engineering including planning, reconnaissance survey and design for main grid, customer service, system controls, miscellaneous line and substation additions. ($3,400).
Miscellaneous Line and Substation Additions	Provide engineering, material procurement and construction for various projects including relocation of 3.5 miles of Naselle-Long Beach 115-KV line No. 1 and various line upgrades. Complete line upgrades. Complete design and construction on various projects started in prior years. ($2,085)	Provide engineering and material procurement for rerouting the Albany-Lebanon 115-KV line, reconductoring of the Snohomish PUD 115-KV line, adding a line terminal and a spare transformer at Murray Substation, adding a disconnect switch at Maple Valley Substation and sectionalizing the Longview-Astoria 115-KV line ($6,500)	Complete construction for rerouting the Albany-Lebanon 115-KV line. Complete constuction of a line terminal and spare transformer at Murray Substation. Complete constuction to add a disconnect switch at Maple Valley Substation. Construct a new switching station at Allston Substation. Upgrade various transmission lines. ($7,000)
System Controls	Provide engineering and material procurement for major facilities including Stability Control Upgrade Phase III, System Events Monitor Phase III, SCADA backup for emergencies - Part I, and RF microwave terminal replacement Phase V. Complete design and construction of	Complete design, material ordering and construction of Stability Control - Upgrade. Design and construct new system control facilities including: breaker failure protection retrofit Phase V, Dispatcher Training Facility Phase I, Back-up AGC System for Eastern Control	Provide design and material procurment for new system control facilities including Dittmer Control Center Dispatcher Training Facility, Back-up AGC System for Eastern Control Center, SCADA. Back-up for Emergencies - Part II, and Breaker

III. Activity Description: Transmission System Development - Capital (continued)

System Controls	various power system control additions for facilities currently underway. System Control enhancements and additions are required to meet system reliability criteria, replace obsolete equipment and to meet inter-utility agreements. ($15,959)	Center, and Microwave RF Replacements Phase VI. Complete design and construction of system control facilities started in prior years. ($13,800)	Failure Protection Retrofit, Phase VI. Complete construction of Microwave RF Replacement, Phase VI. Complete design and construction of other system control facilities started in prior years. ($14,800)
Miscellaneous Completions	Miscellaneous charges and adjustments for completed facilities and for which work orders have been closed. (-$1,062)	Miscellaneous charges and adjustments for completed facilities and for which work orders have been closed. ($800)	Miscellaneous charges and adjustments for completed facilities and for which work orders have been closed. ($800)
Allowance for Funds Used During Construction	Allowance for Funds Used During Construction (AFUDC) represents capitalized interest costs on construction work-in-progress. AFUDC of $12.4 million has been allocated to specific projects for a net effect of $0 in this category. ($0)	Allowance for Funds Used During Construction (AFUDC) represents capitalized interest cost on construction work-in-progress. ($10,300)	Allowance for Funds Used During Construction (AFUDC) represents capitalized interest costs on construction work-in-progress. ($14,800)
Capital to Expense Adjustments	BPA analyzed its outstanding work orders to assess whether they should be expensed. This year, approximately $8 million of work orders were expensed. (-$7,813)	No significant accounting adjustments are expected. ($0)	No significant accounting adjustments are expected. ($0)

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IV. System Additions:

Budget Item	System Additions/Facilities	FY 1989	FY 1990	FY 1991
	Main Grid			
101	Western Montana Transmission	450	0	0
111	D.C. Terminal Expansion	17,405	1,900	0
119	Flathead Valley Reinforcement	74	0	0
120	Bend Area Service	64	0	0
130	Boundry Integration	37	0	0
135	Fall River-Lower Valley Reinforcement	1,787	0	0
150	System Reactive	6,832	19,200	11,500
102	Eugene-Medford (Alvey-Meridian)	238	23,600	43,600
103	Third AC Reinforcement	1,472	65,200	24,000
136	Port Angeles Addition	0	10,800	11,200
137	North Puget Sound Reinforcement	0	0	3,700
138	S.W. Portland Reinforcement	0	300	2,100
139	Cowlitz-Olympia 230-KV Rebuild	0	0	1,300
141	Olympia Peninsula Reinforcement	0	0	1,100
142	Shelton-Fairmont 230-KV Reinforcement	0	0	800
143	Longview System Reinforcement	0	0	9,900
185	Taft-Bell Reinforcement	(753)	0	0
	Total Main Grid	29,112	121,000	109,200
	Area and Customer Service			
316	Salem - Tillamook Reconductor	46	0	0
701	East Lewis County Support	15	1,100	1,800
705	Fossil Area Reinforcement	51	0	0
707	LaPine Area Service	3,378	3,000	0
770	Customer Services	1,720	400	400
711	Gig Harbor Area Reinforcement	0	100	400
712	Shelton Reinforcement	845	1,800	600
713	Snohomish-Beverly Park	3,978	100	0
722	North Pasco Support	3	0	0

IV. System Additions: (continued)

Budget Item	System Additions/Facilities	FY 1989	FY 1990	FY 1991
	Area and Customer Service (continued)			
724	Toledo Transformer Reinforcement	1,475	2,500	100
726	East Minidoka Support	0	0	100
728	Sno-King 230-KV Transformer Addition	0	0	2,800
729	McMinnville Area Support	867	100	0
999	Various System Additions	0	1,000	1,000
	Total Area and Customer Services	12,378	10,100	7,200
820	System Controls	15,959	13,800	14,800
840	Preliminary Engineering and Stock Material	4,777	2,600	3,400
300	Misc. Line and Substation Additions	2,085	6,500	7,000
910	Miscellaneous Completions	-1,062	800	800
	AFUDC and Bond Premiums	0	10,300	14,800
	Capital to Expense Adjustment	-7,813	0	0
	TOTAL CAPITAL TRANSMISSION SYSTEM DEVELOPMENT	55,436	165,100	157,200

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
BORROWING AUTHORITY
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: System Maintenance (Replacements) - Capital

This program provides for planning, design, and construction work to replace transmission line, substation, control system, and general facilities for the transmission system of the Federal Columbia River Power System (FCRPS) in the Pacific Northwest. After 12 years of BPA-imposed funding constraints limiting replacements and other system maintenance, a "catch-up" program has been developed. Both expense and capital elements of the System Maintenance program have been addressed in a FY 1990 plan to bring all scheduled maintenance current by the year 2000. The proposed funding is primarily for replacements of critical portions of the power system which have a high risk of failure or excessive maintenance due to age and deterioration. Much of this equipment is beyond its useful life and lacks spares and factory parts support.

Capital additions and enhancements to the transmission system are found in the Transmission System Development Program.

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II. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Nonelectric Plant Replacements	8,256	8,800	7,000	-20
Transmission Line Replacements	2,537	7,900	2,800	-3
Substation Replacements	26,933	2,,400	21,100	-1
System Protection Replacements	4,120	5,100	4,600	-10
Power System Control Replacements	1,671	7,300	6,800	-7
Tools and Equipment	4,846	6,700	7,800	+16
Environmental Restoration	0	100	100	0
TOTAL	48,363	52,300	50,200	-4

III. Activity Description: System Maintenance - Capital

Program Activity	FY 1989	FY 1990	FY 1991
Nonelectric Plant Replacements	Continue program of replacing facilities and equipment including major maintenance complexes, other O&M buildings, radio station buildings, roof replacements, HVAC replacements, underground storage tank removals, road and yard renovation, and ground grid upgrades. ($8,256)	Continue with replacements as in FY 1989. ($8,800)	Continue with replacements as in FY 1990. Decrease in funding due to completion of Celilo work. ($7,000)
Transmission Line Replacement	Continue program of replacing facilities and equipment including the replacement of wood poles, transmission grounding platforms, pole airway markings, and completions of land acquisitions. ($2,537)	Continue with replacements as in FY 1989. ($2,900)	Continue with replacements as in FY 1990. ($2,800)
Substation Replacements	Continue program of replacing equipment including batteries, chargers, inverters, transformers, power circuit breakers, disconnect switches, and PCB contaminated equipment. ($26,933)	Continue with replacements as in FY 1989 with increased effort in PCB replacements and decrease in transformer replacements. ($21,400)	Continue with replacements as in FY 1990 with a further decrease in transformer replacements. ($21,100)
System Protection Replacements	Continue program of replacing equipment including microwave transfer trips, relays, meters, and oscillographs. ($4,120)	Continue with replacements as in FY 1989. Higher funding level due to increased effort in meter, recorder, and oscillograph replacements. ($5,100)	Continue with replacements as in FY 1990. Completion of oscillograph and multipoint recorder replacements. ($4,600)
Power System Control Replacements	Continue program of replacing equipment including radios, the Dittmer uninterruptible power supply, Dittmer kWh Master, SCADA and multiplex replacements. ($1,671)	Continue with radio replacements as in FY 1989 with increased effort in SCADA, microwave antenna, and multiplex replacements. ($7,300)	Continue with replacements as in FY 1990. Completion of various high density multiplex channel replacements. ($6,800)

III. Activity Description: System Maintenance - Capital (continued)

Program Activity	FY 1989	FY 1990	FY 1991
Tools and Equipment	Continue program of replacing tools and work equipment including transportation equipment, power operated equipment, material handling equipment, laboratory equipment, and power system control equipment. ($4,846)	Continue with replacements as in FY 1989 with increased funding for line truck replacements. ($6,700)	Continue with replacements as in FY 1990 with increased funding for power operated equipment additions and replacement of four aerial man lifts one dump truck, and one auger truck. ($7,800)
Environmental Restoration	Funding for this activity is displayed in a separate environmental restoration line item, beginning in FY 1990. ($0)	Initiate planning for remedial actions at hazardous waste sites within BPA facilities. ($100)	Continue with planning as in FY 1990. ($100)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
BORROWING AUTHORITY
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Fish and Wildlife - Capital

Provides for protection, mitigation and enhancement of Columbia River Basin fish and wildlife affected by the development and operation of hydroelectric projects on the Columbia River and its tributaries pursuant to Section 4(h) of the Pacific Northwest Power Act. BPA discharges a major portion of its fish and wildlife responsibilities and reduces the Administrator's obligation by funding projects designed to carry out the intent of the Northwest Power Planning Council's (Council) Fish and Wildlife Program. The proposed FY 1991 program reflects BPA's continued commitment to 1) its responsibilities under the Pacific Northwest Power Act, and 2) supporting the Council's Fish and Wildlife Program. The FY 1991 program will fund continuation of projects begun in FY 1989 or before with increases largely attributable to projects reaching the design and construction stages in FY 1991. There is one new project for which Congressional approval is requested in FY 1991, the Yakima Basin Screen Facilities Phase II.

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II. Summary Table:

Program Activity	FY 1989	FY 1990 1/	FY 1991 1/	% Change
Anadromous	6,534	11,900	16,600	+40
Resident	422	4,500	200	-96
Pre-Engineering Design	1,174	600	100	-84
TOTAL	8,130	17,000	16,900	-1

1/ These amounts do not reflect all of the recent reductions made during the fourth quarter of FY 1989 and displayed in the October 1989 Master Table of "Summary of Program Costs" prepared for BPA's Programs in Perspective.

III. Activity Description: Fish and Wildlife - Capital

Program Activity	FY 1989	FY 1990	FY 1991
Anadromous Fish	Continue construction of Passage Improvements on the Umatilla River, and pre-design studies on the Nez Perce Artificial Production Facility. Continue pre-design of the Yakima Artificial Production Facilities and finalize design on Umatilla Artificial Production Facilities. ($6,534)	Continue construction of Passage Improvements on the Umatilla River, and pre-design studies on the Nez Perce Artificial Production Facilities and finalize pre-design and initiate construction on the Yakima and Umatilla Artificial Production Facilities. ($11,900)	Initiate construction on Yakima Basin Screen Facilities Phase II. Continue construction on Yakima Artificial Production Facilities. Complete construction on Passage Improvement on the Umatilla River and Umatilla Artificial Production Facilities. Complete pre-design on the Nez Perce Artificial Production Facilities. ($16,600)
Resident Fish	Complete construction on Colville Artificial Production Facility. ($422)	Intiate construction on Galbraith Springs/Sherman Creek Hatcheries. ($4,500)	Complete construction on Galbraith Springs/Sherman Creek Hatcheries. ($200)
Pre-Engineering Design	Fund initial feasibility and pre-design for the NE Oregon Outplanting Facility and Yakima Basin Screen Facilities Phase II. Complete pre-design on Galbraith Springs/Sherman Creek Hatcheries. ($1,174)	Continue pre-design on NE Oregon Outplanting Facility and on Yakima Basin Screen Facilities Phase II. ($600)	Complete pre-design for NE Oregon Outplanting Facility and Yakima Basin Screen Facilities Phase II. ($100)

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IV. Fish & Wildlife Facility Summary:

Program Activity		FY 1989	FY 1990	FY 1991
Anadromous Fish				
FR2104	Three Mile Dam Passage	51	0	0
FR2105	Passage Imprv/Umatilla Rv Div	1,500	800	200
FR2106	Umatilla River Hatchery	1,862	5,600	3,900
FR2107	Nez Perce Res. Low Capital	137	1,000	1,700
FR2108	Yakima Hatchery	2,984	3,700	3,800
FR2113	Yakima Screen Facilities Phase II	0	0	2,000
FR2114	Northeast Oregon Spring Chinook Facility	0	800	5,000
	Subtotal	6,534	11,900	16,600
Resident Fish				
FR2201	Colville Hatchery	422	0	0
FR2203	Galbraith Springs/Sherman Creek Hatchery	0	4,500	200
	Subtotal	422	4,500	200
Pre-Engineering Design				
FR2601	Pre-Engineering Design	1,174	600	100
	Subtotal	1,174	600	100
	TOTAL CAPITAL PROGRAM	8,130	17,000	16,900

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
BORROWING AUTHORITY
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Capital Equipment - Capital

Provides for general and dedicated special purpose ADP equipment, capital software development, and special-use furniture and equipment in support of all BPA programs.

II. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
ADP Equipment	3,740	4,900	3,900	-20
Software Development	3,055	2,700	2,400	-11
Office Equipment	561	800	700	-13
TOTAL	7,356	8,400	7,000	-17

III. Activity Description: Capital Equipment - Capital

Program Activity	FY 1989	FY 1990	FY 1991
ADP Equipment	Upgrade ADP mass storage, acquire miscellaneous central system equipment to support the mainframe, and miscellaneous office equipment to support requirements of the Management Information Systems (MIS) which are in production mode or nearing completion. ($3,740)	Continue to upgrade mass storage in support of the mainframe. Provide ADP equipment to support mass storage in production mode. Upgrade office systems computers and technical computers. Provide for special purpose Computer Aided Design (CAD) equipment. ($4,900)	Continue upgrades and acquire and enhance central and supported systems' peripherals and equipment. ($3,900)

III. Activity Description: Capital Equipment - Capital

Program Activity	FY 1989	FY 1990	FY 1991
Software Development	Continue development of ongoing MIS's [Financial Management Information System-Integration, (FMIS-I) System Maintenance Information System (SMIS), and Wholesale Power Billing (WPB)] Complete Project Management Information System (PMIS) and Materials Management System (MMS). ($3,055)	Continue development of approved MIS's (FMIS-I, SMIS, and WPB). ($2,700)	Continue development of approved MIS's (FMIS-I, SMIS, and WPB). ($2,480)
Office Equipment	Purchase printing, graphics, audio/visual, and duplicating equipment; telephone; special-use furniture; and records equipment (facsimile and micrographic). ($561)	Acquire printing equipment and filing equipment. ($800)	Acquire printing, reproduction, audio/visual, warehouse, mailroom, and telecommunications equipment and office furniture. ($700)

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Residential Exchange - Operating Expense

The Pacific Northwest Power Act created the residential exchange program to extend the benefits of low-cost Federal power to the residential and small farm customers of investor-owned and publicly owned utilities. Although it appears to be primarily a power transaction and is so treated in BPA's rate proceedings, the residential exchange is not a power transaction in the conventional sense. In effect, the program acts to lower the rates paid by the residential and small farm customers of exchanging utilities. No power is transferred to or from BPA. The gross cost of the exchange is partially offset by exchange revenues from participating utilities.

The Residential Exchange consists of the Residential Purchase and Sale Agreement (RPSA) and the Exchange Transmission Credit Agreement (ETCA). For the RPSA, the paper transaction operates as follows: BPA acquires certain amounts of power offered for sale by participating Pacific Northwest electric utilities. That power is acquired at each utility's "average system cost" (ASC), which includes both generation and transmission costs. In exchange, BPA must sell an equivalent amount of electric power to the participating utilities for resale to the utilities' residential and small farm customers in the region. The power is sold at BPA's Priority Firm (PF) Rate, which is generally lower than the utilities' ASC. Since the same amount of power is involved, the "sale" of power is an accounting procedure used to determine the amount of benefit to be received by customers of exchanging utilities. In practice, only dollars are exchanged.

The ETCA, a much smaller element of the residential exchange gross cost, is available to BPA's public utility and cooperative customers and limits their benefit payments to the cost of their transmission facilities. The payments, however, cannot be greater than the amount that the utility would have received if it had participated in the RPSA.

Changes from year to year in exchange costs are due to combinations of factors including increases in utilities' ASC, load growth, the number of utilities participating in the program, and the level of BPA's own rates.

II. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Residential Exchange Gross Cost	789,303	890,900	928,500	+4
Revenue from Residential Exchange	631,844	744,200	749,300	+1
Net Obligations	157,459	146,700	179,200	+22

III. Activity Description: Residential Exchange

Program Activity	FY 1989	FY 1990	FY 1991
Residential Exchange Gross Cost	BPA exchanged 3,011 average MW of energy with utilities in the region as mandated in the Pacific Northwest Power Act in order to extend the benefits of low-cost Federal power to residential and small farm consumers. Although the residential exchange appears to be primarily a power transaction, no power is transferred to or from BPA. ($789,303)	BPA will exchange 3,535 average MW of energy with 23 utilities in the region as mandated in the Pacific Northwest Power Act in order to extend the benefits of low-cost Federal power to residential and small farm consumers. Although the residential exchange appears to be primarily a power transaction, no power is transferred to or from BPA. The decrease in net obligations is primarily attributable to lower ASC forecasts of exchanging utilities. The lower ASC forecasts resulted from higher forecasts of system loads and irrigation discounts. ($890,900)	BPA will exchange 3,576 average MW of energy with 23 utilities in the region as mandated in the Pacific Northwest Power Act in order to extend benefits of low-cost Federal power to residential and small farm customers. Although the residential exchange appears to be primarily a power transaction, no power is transferred to or from BPA. The increase is primarily due to higher ASC forecasts of exchanging utilities. ($928,500)

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: System Operations - Operating Expense

The System Operations Program operates and controls the BPA high-voltage transmission system to provide safe, reliable, efficient, and cost-effective service to the Pacific Northwest region's customers and to the interconnected transmission system. This is accomplished through three main functions: substation operations, power system control and dispatching, and operations standards and engineering. This program is almost entirely composed of staff-related costs. The program is essentially stable and no significant new initiatives are contemplated.

II. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Substation Operations	14,905	18,000	18,800	+4
Power System Control and Dispatching	6,454	7,400	7,700	+4
Operations Standards and Engineering	3,613	4,300	4,400	+2
TOTAL	24,972	29,700	30,900	+4

III. Activity Description: System Operations

Program Activity	FY 1989	FY 1990	FY 1991
Substation Operations	Perform operation functions necessary to provide electric service to customers and to protect the Government's investment in electric equipment. Substation operations include making equipment adjustments to maintain loads and voltages within acceptable limits, switching to deenergize lines and equipment during emergencies or	The FY 1990 activities continue as stated for FY 1989. In FY 1990, this activity will provide for the operation of 387 substations and 14,727 circuit miles of transmission lines. The increased funding is due to enhancing the Substation Operator Apprentice Program in anticipation of increase retirements; positions now	The FY 1991 activities continue as stated for FY 1989 and 1990. In FY 1991, this activity will provide for the continued operation of 387 substations and 14,727 miles of transmission lines. ($18,800)

III. Activity Description: System Operations (continued)

Program Activity	FY 1989	FY 1990	FY 1991
Substation Operations (continued)	scheduled maintenance, isolating damaged equipment, restoring service to customers, visually inspecting equipment, reading meters and recording line and equipment loading and voltages. In FY 1989, this activity provides for the operation of 387 substations (an increase of 1 over FY 1988) and 14,727 circuit miles of transmission lines (an increase of 81). ($14,905)	filled that have been vacant, higher employee relocation costs, and inflation. ($18,000)	
Power System Control & Dispatching	This activity includes central dispatching, control, and monitoring of the electric operation of the Federal transmission system. Also includes load, frequency, and voltage control of Federal generating plants; the operation of the system control and data computers at the Dittmer and Eastern Control Centers; modification and maintenance of the operation-related computers. Major effort during the FY 1986-1990 period is the replacement of two major power system control systems (SCADA and RODS). ($6,454)	The FY 1990 activities continue as stated for FY 1989. Program increases are due primarily to inflation and increased corporate support for these activities. ($7,400)	The FY 1991 activities continue as in FY 1989 and FY 1990. ($7,700)
Operations Standards & Engineering	This activity includes analyzing the following: system loads, voltage levels, outage information, stability levels and other data and, making policy recommendations for system operations, planning operations' practices, restoration plans and disturbance re-	The FY 1990 activities continue as stated for FY 1989. Changes in funding levels are due to increased use of ADP services, additional field support, and inflation. ($4,300)	The FY 1991 activities continue as stated for FY 1989 and 1990.) ($4,400)

III. Activity Description: System Operations (continued)

Program Activity	FY 1989	FY 1990	FY 1991
Operations Standards & Engineering (continued)	ports. Provides for development of control center requirements for centralized automation of substations and generation. Also includes BPA participation with other utilities in developing utility operating standards and guides. ($3,613)		

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Power Marketing - Operating Expense

Provides for electric utility power marketing efforts, interregional intertie policy development and negotiation, wholesale power and transmission rates development, contract development, administration of power and transmission agreements, supporting environmental review and analysis, and public involvement support of power marketing activities. Program trends emphasize firm surplus power and capacity marketing and Long-Term Intertie Access Policy (LTIAP) implementation.

II. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Wholesale Power and Transmission Rates	4,677	4,600	4,800	+4
Power Contracts and Customer Service	7,181	9,800	10,100	+3
Special Coordination	3,044	5,200	5,000	-4
Wheeling	26,312	31,200	31,200	0
TOTAL	41,214	50,800	51,100	+1

Program Activity	FY 1989	FY 1990	FY 1991
Wholesale Power and Transmission Rate	The Wholesale Power and Transmission Rate function develops the rates that customers pay BPA for electric power and for wheeling their own power on BPA's transmission system. Rates are established through a rate making process consistent with the Pacific	Funding in FY 1990 continues prior year activities with emphasis on design and analyses to evaluate short and long term effects of rates and charges that support BPA policy goals. Conduct rate evaluations in support of future rate development.	Continue prior year activities with increased emphasis on preparation of a possible new rates development process resulting in improved financial flexibility to meet obligations and enhance marketability of BPA's power and transmission products. ($4,800)

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III. Activity Description: Power Marketing (continued)

Program Activity	FY 1989	FY 1990	FY 1991
Wholesale Power and Transmission Rate (continued)	Northwest Power Act. Rates must be adequate to ensure revenues sufficient to pay BPA's operating expenses, debt repayment, and amortization of the federal investment in the Federal Columbia River Power System. Rate activities included a series of workshops to advance rate case simplification efforts, pursuit of FERC approval for surplus firm and firm capacity pricing mechanisms, and preparation of rate design studies to support a possible 1990 rate development process. Such a process would have resulted in rates which would improve financial flexibility, meet Treasury obligations, and enhance marketability of BPA's power and transmission products. BPA decided near the end of the fiscal year that no rate process would be required in FY 1990. ($4,677)	Funding changes reflect workload associated with BPA's 2-year rate period within a dynamic operating environment. ($4,600)	
Power Contracts and Customer Service	The Power Contracts function negotiates, administers, and coordinates contracts for power sales, power exchanges, conservation, wheeling, and resource services. The Customer Service function analyzes, processes, and issues all customer bills and implements Customer Service Policy and develops service requirements criteria. Beginning in 1986, and continuing through 1988, capacity energy exchange contracts with California utilities expired resulting in increased workload to	During FY 1990, activities will emphasize implementation of BPA's LTIAP, intertie expansion analysis, and capacity marketing. Completion of the Wholesale Power System Design is expected to advance progress toward more accurate and timely billing of BPA's customers. ($9,800)	During FY 1991, emphasis will continue on capacity contracts. ($10,100)

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III. Activity Description: Power Marketing (continued)

Program Activity	FY 1989	FY 1990	FY 1991
Power Contracts and Customer Service (continued)	develop new long-term contracts. Emphasis was also placed on increasing revenues through long term sales to Pacific Northwest utilities. Customer Service and billing of BPA's more than 150 customers continued at prior service levels. ($7,181)		
Special Coordination	Special Coordination provided specialized support to the Power Marketing Program in surplus power marketing efforts, intertie policy development and analysis, and increased public involvement support in all phases of policy development. It also provided environmental analysis in support of fish and wildlife projects, the intertie access policy, the acquisition of resource options, and in various rate options considered by BPA. ($3,044)	Emphasis continues prior years' activities. Actions will be underway related to the NEPA documents required for the Third AC line or non-Federal participation, Pacific Northwest Coordination Agreement renegotiation, and capacity marketing. Efforts to accomplish Long Term Intertie Access Policy environmental mitigation will continue through contracting. ($5,200)	Activities continue as in FY 1990. Increases in power marketing and fish and wildlife program activities result in an increase in supporting environmental documents and implementation of public involvement procedures. ($5,000)
Wheeling	Wheeling Services includes three types of costs. First, it funds payments to other utilities to transmit Federal power where no Federal transmission exists. Second, it funds leases with other utilities when those facilities are required for delivering Federal power. Third, it funds payments to BPA customers for maintaining BPA facilities when it is in BPA's economic interest to do so. ($26,312)	Wheeling activities continue as in FY 1988. Funding increases are due to contractual commitments. ($31,200)	Continue prior years' activities. ($31,200)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Power Scheduling - Operating Expense

Power scheduling activities provide for forecasting, on a short-term basis, the hourly power requirements of BPA utility, industrial, and governmental customers and the interchange of power with the region's interconnected electric utilities and with utilities in the Southwest and Canada. These requirements are met by scheduling the power to be generated at each Federal plant. Power scheduling activities also include weather and streamflow forecasting, controlling the storage and utilization of water in the reservoirs, power purchases for resale and the efficient operation of the power system, and coordinating power production with the multipurpose operation of the Columbia River and related intertie system. Finally, the power scheduling function is also composed of the preparation of Federal Columbia River Power System (FCRPS) seasonal load resources planning activities and current short-term operating plans and the short-term marketing of BPA's surplus firm energy. This program is becoming increasingly complex due to the evolving mix of BPA's hydro and thermal generating resources, constraints on hydro operations and BPA emphasis on power marketing.

II. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Power Scheduling	4,707	5,800	6,000	+3
Power Purchases	93,012	14,400	15,200	+6
Storage Return	6,152	11,000	11,600	+5
Upstream Benefits	1,505	1,600	1,800	+13
TOTAL	105,376	32,800	34,600	+5

III. Activity Description: Power Scheduling

Program Activity	FY 1989	FY 1990	FY 1991
Power Scheduling	Schedule and interchange 125 million megawatt hours (MWh) of electric energy to 150 BPA customers and Pacific Northwest's interconnected utilities.	Schedule and interchange 126 million MWh of electric energy. Major emphasis will be scheduling and supporting implementation of intertie access policy stream-	Continue activities as described for FY 1990. ($6,000)

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III. Activity Description: Power Scheduling (continued)

Program Activity	FY 1989	FY 1990	FY 1991
Power Scheduling (continued)	Major emphasis was on scheduling and supporting implementation of intertie access policy streamflow coordination with the water budget of the Fish and Wildlife program. ($4,707)	flow coordination with the water budget of the Fish and Wildlife program. ($5,800)	
Power Purchases	BPA purchased power for resale or for the efficient operation of the power system. Changing assumptions of purchase from the members of the Northwest Coordination Agreement, variation in the terms of the Service and Exchange Agreements, BPA rates, weather conditions, and river regulation affect the amount budgeted for Power Purchases. FY 1989 requirement for power purchases reflected lower than normal streamflows brought on by drought conditions for the second consecutive year and extreme cold temperatures along the entire West Coast during February 1989. ($93,012)	BPA will purchase power for resale or for the efficient operation of the power system. Changing assumptions of purchase from the members of the Northwest Coordination Agreement, variation in the terms of the Service and Exchange Agreements, BPA rates, and river regulation affect the amount budgeted for Power Purchases. The FY 1990 estimate for power purchases reflects improved stream flow assumptions over FY 1989. ($14,400)	Continue activities as described for FY 1990. ($15,200)
Storage Return	BPA pays other generating utilities for the use of their systems for temporarily holding energy for BPA. The actual use of this account varies with streamflows, load, thermal plant operations, and many other variables, as the objective of this item is the efficient operation of the BPA system. Only obligations for BPA are included; receipts from storage services BPA provides are not included. ($6,152)	Continue activities as described for FY 1989. Because water conditions can be so varied, (budget) estimates are based on 50% probability occurence of opportunities or need for storage services. ($11,000)	Continue activities as described for FY 1990. Because water conditions can be so varied, (budget) estimates are based on 50% probability occurence of opportunities or need for storage services. ($11,600)

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III. Activity Description: Power Scheduling (continued)

Program Activity	FY 1989	FY 1990	FY 1991
Upstream Benefits	BPA pays non-Federal parties with reservoirs upstream of Federal reservoirs to meet contractual obligations pursuant to the Pacific Northwest Coordination Agreement (PNCA). The PNCA requires Federal payment to non-Federal reservoirs operators for benefits derived from water storage at the non-Federal upstream reservoirs. ($1,505)	Continue activities as described for FY 1989. ($1,600)	Continue activities as described for FY 1989. ($1,800)

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Planning Council - Operating Expense

This budget program provides funding for operation of the Pacific Northwest Electric Power and Conservation Planning Council (Council). The Council of PNW State members was established pursuant to the Pacific Northwest Power Act of 1980. Its major activities center around the periodic preparation of a Northwest Conservation and Electric Power Plan (a 20-year electric energy demand and resource forecast and energy conservation program) and a Columbia River Basin Fish and Wildlife Program of loss mitigation and resource enhancement actions. The Council will monitor implementation of its Power Plan and Fish and Wildlife Program and revise them as changing conditions require. Major revisions will be undertaken every 5 years if no significant changes cause a major revision in the interim. The Power Plan is scheduled to be revised in FY 1990 and the Fish and Wildlife Program is scheduled to be amended in FY 1992.

Funding for the Council is provided by BPA and is recoverable from BPA rates. The Pacific Northwest Power Act directs that expenses of the Council (subject to certain limits) shall be included in BPA's annual budget submitted to Congress pursuant to the Transmission Act of 1974. The limits are computed as a millage rate times the kilowatthours of firm power forecasted to be sold by BPA.

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II. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
TOTAL	7,373	7,500	7,500	0

III. Activity Description: Planning Council

Program Activity	FY 1989	FY 1990	FY 1991
Planning Council	Funding for Council activities. ($7,373)	Fund Council activities. Subsequent to preparation of BPA's budget, the Council adopted a revised budget of $7,245. ($7,500)	Fund Council activities. Subsequent to preparation of BPA's budget, the Council adopted a budget of $7,541. ($7,500)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Reimbursable - Operating Expense

BPA enters into written agreements with Federal and non-Federal entities that have work or a service to be performed. The reimbursable activities are performed by existing BPA staff at the expense of the benefitting utilities. The projects must be beneficial, under the one-utility concept, to BPA operations and to the Federal or non-Federal entity involved. Additionally, these activities contribute to more efficient or reliable construction, operation and maintenance of the Federal transmission system or otherwise enhance electric service to the region. This program consists of commodities, work or services furnished by BPA to Federal and non-Federal entities for which funds are received and credited to the BPA Fund. The majority of the program is for funding reimbursable power purchases. The FERC Coordination Agreement payment is a reimbursable activity in which BPA serves as an agent for non-Federal hydro operators for the collection of funds due to the U.S. Treasury pursuant to Section 10(f) of the Federal Power Act and the Pacific Northwest Coordination Agreement.

II. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Short-Term Power Purchases	36,939	84,400	88,200	+5
Work Done for Others	9,978	14,700	12,500	-15
FERC Coordination Agreement	3,411	3,500	3,600	+3
TOTAL	50,328	102,600	104,300	+2

III. Activity Description: Reimbursable

Program Activity	FY 1989	FY 1990	FY 1991
Short-Term Power Purchases	Reimburse short-term power purchases for the Exportable Agreement, (expired 12/88), the Service Exchange Agreement and the Industrial Replacement Energy (IRE) Agreement. Funding expenses under	Reimbursable short-term power purchases for the Service and Exchange Agreement, the IRE Agreement, and the Alternate Fuel Energy Agreement. The forecasted increase over FY 1989 is due to larger	Reimbursable short-term power purchases for the Service and Exchange Agreement, the IRE Agreement and the Alternate Fuel Energy Agreement. The increase over FY 1990 is due to

III. Activity Description: Reimbursable (continued)

Program Activity	FY 1989	FY 1990	FY 1991
Short-Term Power Purchases (continued)	the Service and Exchange Agreement were almost $10,000 under expectations due to changes in actual river operations compared to planned operations. ($36,939)	expected reimbursable energy purchases under all the agreements. ($84,400)	larger expected reimbursable energy purchases under all the agreements. ($88,200)
Work Done for Others	Perform reimbursable work for others. This includes construction, operation and maintenance of transmission system facilities and related utility and general support for customers and other entities. The transmission system facility activity was about $1,300. Other activities were delayed to further years resulting in an additional underrun of approximately $4,000. ($9,978)	The activities remain the same as in FY 1989. The increase over the prior year is due to an increase in the level of transmission system development work combined with small reductions in general support for other entities. ($14,700)	The activities remain the same as in FY 1990 but at a lower funding level. ($12,500)
Federal Energy Regulatory Commission (FERC) Coordination Agreement	This item covers payments to the General Fund of the Treasury which the FERC determines are due the Federal Government pursuant to Section 10(f) of the Federal Power Act for downstream benefits realized at non-Federal hydroelectric projects as a result of storage releases from upstream Federal reservoirs. BPA will make payments on behalf of the non-Federal operators and in accordance with the Pacific Northwest Coordination Agreement. These Treasury payments offset a portion of the amount BPA owed for O&M expenses at the relevant Corps of Engineers and Bureau of Reclamation projects. ($3,411)	Continue FERC Coordination payments. ($3,500)	Continue FERC Coordination payments. ($3,600)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Interest - Operating Expense

The Federal Columbia River Transmission System Act, as amended by the Pacific Northwest Power Act and replenished by Public Law 98-50, provided borrowing authority of $3.75 billion to assist in financing the construction, acquisition, and replacement of the transmission system and to implement the Administrator's authority pursuant to the Pacific Northwest Power Act, including his authority to provide financial assistance for conservation measures, renewable resources, and fish and wildlife. This item covers the payment of interest to the U.S. Treasury on those borrowings. Interest estimates are a direct function of program levels and new plant-in-service estimates. BPA had the opportunity during FY 1989, according to agreements with the U.S. Treasury, to call certain outstanding bonds sold to the Treasury during FY 1983 and FY 1984. BPA chose to amortize $120 million of outstanding transmission construction bonds and refinanced $120 million of a $150 million outstanding conservation bond while amortizing the remaining $30 million. The bond premiums associated with the amortized bonds amounted to $15.8 million.

Starting in FY 1991, interest payments on BPA and Corps unpaid appropriations will be displayed in the budget as an operating expense. This reflects BPA's longstanding practice and is consistent with accepted accounting treatment of interest payments.

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II. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
BPA Bond Interest	146,233	134,000	121,200	-10
BPA Appropriation Interest	—	—	58,800	
Corps Appropriation Interest	—	—	133,400	
Bureau of Reclamation Interest	25,076	30,000	32,400	+8
TOTAL	171,309	164,000	345,800	

III. Activity Description: Interest (continued)

Program Activity	FY 1989	FY 1990	FY 1991
BPA Bond Interest (Net)	Payment was made to the U.S. Treasury of net interest due on outstanding bonds issued to finance construction, acquisition, and replacement of the transmission system, conservation measures, renewable resources, and fish and wildlife projects and capital equipment. The amount paid was net of Allowance for Funds Used During Construction (AFUDC) and interest income. ($146,233)	Continue payment to the U.S. Treasury of net interest due on outstanding bonds. The decrease is primarily due to an increase in interest credit on cash reserves. ($134,000)	Continue payment to the Treasury of net interest due on outstanding bonds. The decrease is primarily due to increases in interest credit on cash reserves and an increase in AFUDC. ($121,200)
BPA Appropriation Interest	Included in Capital Transfers.	Included in Capital Transfers.	Interest payments on BPA appropriations debt incurred before self-financing. ($58,800)
Corps of Engineers Appropriation Interest	Included in Capital Transfers.	Included in Capital Transfers.	Interest costs of continued appropriations. ($133,400)
Bureau of Reclamation Appropriation Interest	This item covered payments to the General Fund of the U.S. Treasury to repay interest due on appropriated funds used to finance Bureau of Reclamation power generation facilities of the FCRPS. This item also covered repayments of the Federal investment in transmission facilities and the power share of the Federal hydroelectric projects operated by the Bureau. ($25,076)	Continue payments to the General Fund of the U.S. Treasury for interest and amortization on Bureau unpaid appropriations. ($30,000)	Interest costs of continued appropriations. ($32,400)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Associated Project Costs - Operating Expense

This program provides funding for expenses BPA incurs for U.S. Army Corps of Engineers and U.S. Bureau of Reclamation hydroelectric facilities of the Federal Columbia River Power System (FCRPS). The Corps and Bureau operate 30 hydroelectric projects which serve many purposes including flood control, navigation, irrigation, recreation and water supply. The projects supply about 87 percent of BPA's firm energy. Both agencies are emphasizing maximum power production from existing facilities and improvement of the performance and availability of power units. BPA is improving its oversight function and is currently working with both agencies to identify opportunities to reduce or defer costs. BPA repays additional financing costs of FCRPS facilities through its Interest Expense and Capital Transfer budget programs. Pursuant to the Lower Snake River Compensation Plan (LSRCP), BPA is also responsible for the actual operations and maintenance (O&M) expenditures incurred and repays the Treasury accordingly.

II. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Bureau of Reclamation				
O&M & Amortization	26,076	34,900	35,100	+1
Corps of Engineers O&M	64,786	69,200	69,500	0
Lower Snake Compensation Plan O&M	7,356	9,000	11,200	+24
TOTAL	98,218	113,100	115,800	+2

III. Activity Description: Associated Project Costs

Program Activity	FY 1989	FY 1990	FY 1991
Bureau of Reclamation O&M & Amortization	This item was for payments to the Reclamation Fund covering the costs of operation and maintenance of Bureau of	Continue Bureau project cost support. Increase is due: 1) to unbudgeted salary increases for wage board em-	Continue Bureau project cost support. Increase is due to revised project estimates. ($35,100)

III. Activity Description: Associated Project Costs (continued)

Program Activity	FY 1989	FY 1990	FY 1991
Bureau of Reclamation O&M & Amortization (continued)	Reclamation hydroelectric projects that are part of the FCRPS allocated to be repaid from BPA revenues. ($26,076)	ployees; 2) a GAO audit relative to overhead distribution as directed by the Commissioner, Bureau of Reclamation; and 3) revised project estimates. ($34,900)	
Corps of Engineers O&M	This item covered payments to the General Fund of the Treasury for the power share of the operation and maintenance costs of Corps of Engineers generating projects repayable from BPA revenues. (Payments were also made to the Treasury from BPA revenues for interest and amortization of the power share of the appropriated investment in the Corps of Engineers projects. These costs were treated as Capital Transfers and appear in that section.) ($64,786)	Continue Corps project cost support. Increase is due to revised project estimates. ($69,200)	Continue Corps project cost support. ($69,500)
Lower Snake River Compensation Plan O&M	This item included payments to the General Fund of the Treasury for the operation and maintenance of the Lower Snake River hatcheries pursuant to the LSRCP authorized by the Water Resources Development Act of 1976. In total, 22 hatchery facilities are planned. LSRCP stipulates that	Continue LSRCP payments. ($9,000)	Increase reflects completion of the Clearwater hatchery construction and commencement of O&M. ($11,200)

III. Activity Description: Associated Project Costs (continued)

Program Activity	FY 1989	FY 1990	FY 1991
Lower Snake River Compensation Plan O&M (continued)	100 percent of the anadromous fish and 83.8 percent of resident fish mitigation costs be repaid to the Treasury from power sales. The Corps of Engineers is constructing the hatchery facilities through direct appropriations. The Fish and Wildlife Service manages the operation and maintenance of the facilities ($7,356)		

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Energy Resources - Operating Expense

The Energy Resource Program includes all BPA resource planning and acquisition for conservation and generation. It also includes the annual costs and oversight activities for previously-acquired resources. Beginning in FY 1991, a previously capitalized portion of the conservation program will be modified to reflect prevailing industry practices.

The Energy Resources Program identifies the Administrator's load obligations, plans for the development of resources, and acquires resources as needed. The Pacific Northwest Electric Power Planning and Conservation Act of 1980 requires BPA to treat conservation as the region's highest priority resource in planning to meet the Administrator's load-serving obligations.

During FY 1989, lawsuits, known as MDL-551, alleging securities fraud in the sales of bonds for Washington Nuclear Plants (WNP) 4 and 5 were settled. Settlement agreements are subject to final approval by the court and are under consideration at this time. BPA, the State of Washington, and various utility defendants agreed to pay $236 million in return for the plaintiffs' agreements to drop action against BPA and to indemnify for any claims brought against BPA by remaining defendants. BPA's share of the settlement was $20 million, which is included in this budget as a FY 1989 obligation.

Settlement of these lawsuits cleared the way for BPA and the Washington Public Power Supply System to begin refinancing the high interest debt which funded construction of WNP-1, -2, and -3. The first refinancing of $721 million in high interest bonds was completed in October. The second, for $831 million, occurred in December. Annual debt service savings from the first two refunding sales will average approximately $50.2 million for the period 1990 through 1998 and $29.4 million for the period 1999 through 2011. The total refinancing effort is expected to reduce BPA's total debt service by about $70 to $80 million a year.

In formulating the FY 1991 Energy Resources Program expense funding levels, BPA examined program levels in the context of a revised resource program, current levels of program participation, the need to contain costs in the short-term but meet BPA's long-term power supply obligations in a cost-effective manner, and the emphasis placed on lost opportunity resources, pilot, demonstration and evaluation efforts called for by the Northwest Power Planning Council's (Council) Northwest Conservation and Electric Power Plan (Power Plan). Consistent with these decision factors, during FY 1990, BPA expects to transfer funds to the Corps of Engineers under the Economy in Government Act to reduce generating losses at Dworshak resulting from necessary diversion of water from Dworshak to the new Clearwater Fish hatchery. This hatchery was authorized as part of the Lower Snake River Fish and Wildlife Compensation Plan in the Water Resources Development Act of 1976 (Section 102).

I. Preface: Energy Resources - Operating Expense (continued)

Ninety-five percent of the FY 1991 expense funding for this program is essentially fixed. It consists of generating plants' debt service of $612.8 million, generating plants operation, maintenance, and preservation costs of $300.5 million (including investor-owned utility (IOU) settlement costs for WNP-3), and the contractually committed costs for EWEB residential weatherization of $2.1 million and Aluminum Smelters Conservation/Modernization of $9.4 million. The five percent of the program which is subject to direct BPA control, has been constrained to minimize adverse effects on BPA's long-term debt and wholesale power rates while still meeting essential program requirements.

Remaining budget requirements for this program are found in the capital programs Key Activity Summary for Energy Resources.

II. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Residential Sector	17,944	18,500	34,800	+88
Commercial Sector	4,875	5,800	11,100	+91
Industrial Sector	8,033	11,800	15,400	+31
Generation	7,740	10,700	10,600	-1
Large Thermal Generating Plants				
Trojan	69,291	65,100	70,200	+8
Washington Nuclear Plant-1/ Hanford Generating Project	212,435	214,159	214,300	0
Washington Nuclear Plant-2	400,421	432,500	449,500	+4
Washington Nuclear Plant-3	170,132	173,900	174,100	0
Large Thermal Oversight and Legal Services	24,928	2,600	2,600	0
Resource Planning	16,327	19,000	18,900	-1
TOTAL	931,226	954,059	1,001,500	+5

III. Activity Description: Energy Resources - Expense

Program Activity	FY 1989	FY 1990	FY 1991
Residential Sector	Reimbursed Eugene Water and Electric Board (EWEB) for Residential Weatherization. Reimbursed local governments and utilities for enforcement of Model Conservation Standards (MCS) developed by the Pacific Northwest Power Planning Council and continued the Super Good Cents marketing program. Conducted marketing and education activities for improved energy efficiencies for appliances and manufactured homes. Continued the State and Local Government Assistance (includes Indian Tribes) Program to encourage efficient use of electrical energy and renewable resources. ($17,944)	Continue reimbursing EWEB for Residential Weatherization. Continue to reimburse local governments and utilities for enforcement of MCS developed by the Pacific Northwest Power Planning Council. Continue the Super Good Cents marketing program. Carry out marketing and education activities for improved efficiencies for appliances and manufactured homes. Continue the State and Local Government Assistance (includes Indian Tribes) Program to encourage efficient use of electrical energy and renewable resources. Increases in FY 1990 is due to recent MCS adoption by local jurisdictions. ($18,500)	Continue reimbursing EWEB for Residential Weatherization. Continue to reimburse local governments and utilities for enforcement of MCS developed by the Pacific Northwest Power Planning Council. Continue the Super Good Cents marketing program. Carry out marketing and education activities for improved efficiencies for appliances and manufactured homes. Continue the State and Local Government Assist- (includes Indian Tribes) Program to to encourage efficient use of electrical energy and renewable resources. Increase in FY 1991 is due to enhanced funding for MCS. ($18,600) To the extent possible, BPA will supplement its reduced Treasury borrowing with revenue financing to fund a substantial portion of the formerly capitalized residential sector activities. ($16,200) (Total $34,800)
Commercial Sector	Continued the Purchase of Energy Savings (PES) Program. Studied and carried out education activities for improved energy efficiency improvements in the Commercial Sector. Encouraged energy efficiency improvements in the commercial buildings through the Energy Edge	Continue the PES Program. Encourage energy efficiency improvements in new commercial buildings through development of a program that goes beyond the commercial MCS. Continue programs to study potential energy conservation measures such as	Continue to encourage energy efficiency improvements in the new commercial buildings through the development of a program for commercial facilities that goes beyond the commercial MCS. Continue the CREUS and and EMS Programs. Provide a facili-

III. Activity Description: Energy Resources - Expense

Program Activity	FY 1989	FY 1990	FY 1991
Commercial Sector (continued)	Program and development of a program for commercial facilities that goes beyond the commercial MCS. Completed the expensed Energy Smart Design Assistance Program. Provided a facility, in conjunction with others, to test and demonstrate energy-efficient lighting solutions. ($4,875)	the Commercial Retrofit End-use Study (CREUS), Ventilation Air Tempering and Evaluation of Energy Management Study (EMS) Programs. Provide a facility, in conjunction with others, to test and demonstrate energy-efficient lighting solutions. The apparent increase in funding is due to lower than planned expenditures in FY 1989. ($5,600)	ty, in conjunction with others, to test and demonstrate energy efficient lighting solutions. Do research on technologies and methods to obtain futher energy conservation commercial structures. The decrease in funding is due to a reduction in funding for the Energy Edge Program. ($4,900) To the extent possible, BPA will supplement its reduced U.S. Treasury borrowing with revenue financing to fund a substantial portion of the formerly capitalized commercial sector activities. ($6,200) (Total $11,100)
Industrial Sector	Continued the Sponsor-Designed Program. Continued the Aluminum Smelter Conservation Modernization (Con/Mod) Program to encourage installation of more efficient processes in smelters. Continued the Partership Program in support of customer marketing and regional economic development objectives, and establishment of viable regional markets for surplus power. Enhanced the reliability of industrial conservation as a resource through research, development and demonstration (RD&D) projects. ($8,033)	Continue payments for the Sponsor-Designed program and the Con/Mod Program to encourage installation of more efficient processes in smelters. Continue the Partnership Program, including DesignWise, in support of customer marketing and regional economic development objectives. Enhance the reliability of industrial conservation as a resource through RD&D projects. Increase in funding is due to higher payments to Con/Mod participants. Although the majority of aluminum plant efficiencies were brought on line in FY 1989, the payments for these efficiencies will continue for the next 10 years. ($11,800)	Continue payments for the Sponsor-Designed Program and the Con/Mod Program. Continue the Partnership Program, including DesignWise, in support of customer marketing and regional economic development objectives. Enhance the relibility of industrial conservation as a resource through RD&D projects. Increase in funding is due to additional payments to Con/Mod participants. ($12,600) To the extent possible, BPA will supplement its reduced U.S. Treasury borrowing with revenue financing to fund a substantial portion of the formerly capitalized industrial sector activities. ($2,800) (Total $15,400)

III. Activity Description: Energy Resources - Expense (continued)

Program Activity	FY 1989	FY 1990	FY 1991
Generation	Provided engineering support and continued Generating Resource RD&D efforts in areas such as geothermal and hydro power. Explored, validated, conducted demonstrations and instituted programs to develop the most promising hydro system efficiency improvements. Evaluated the usefulness of the hydro options program.	Provide engineering support and continue Generating Resources RD&D efforts in areas such as geothermal and hydro power. Explore, validate, conduct demonstrations, and institute programs to develop the most promising hydro system efficiency improvements. Evaluate the usefulness of the hydro options program, generation acquisition process and conservation bidding process.	Provide engineering support and continue Generating Resources RD&D efforts in areas such as geothermal and hydro power. Explore, validate, conduct demonstrations, and institute programs to develop the most promising hydro system efficiency improvements and lost opportunity resources. Evaluate the usefulness of the hydro options program, generation acquisition process, and conservation bidding process.
	Acquired 100% of the Idaho Falls Hydroelectric project capabilities. Provided oversight of the Idaho Falls hydroelectric project, Corps of Engineers budgets, Bureau of Reclamation budgets, and the Hydro Options contracts. ($7,740)	Continue to acquire 100% of the Idaho Falls Hydroelectric project capabilities. Provide oversight of the Idaho Falls Hydroelectric project, Corps of Engineers budgets, Bureau of Reclamation budgets, and the Hydro Options contracts. Increase in funding is for hydro system efficiency improvement projects. ($10,700)	Continue to acquire 100% of the Idaho Falls Hydroelectric project capabilities. Provide oversight of the Idaho Falls Hydroelectric project, Corps of Engineers budgets, Bureau of Reclamation budgets, and the Hydro Options contracts. ($10,600)
Trojan	Continued to acquire 30 percent of Trojan Nuclear Plant capability (debt service, $9,492; operations, $57,544; prepaid expense, $2,255). ($62,291)	Continue to acquire capabilities of 30% of the Trojan Nuclear Plant (debt service, $9,900; operations, $55,200). Increase is due to expected advance purchase of nuclear fuel. ($65,100)	Continue to acquire capabilities of 30% of the Trojan Nuclear Plant (debt service, $9,900; operations, $60,300). Increase over FY 1990 is due to cost of fuel and cost of operating and maintaining the plant. ($70,200)
WNP-1/HGP	Continued to fulfill contractual obliga- (debt service, $208,251; preservation, $-892; other net billed expense, $3,073; prepaid expense, $2,003). ($212,435)	Continue to fulfill contractual obligations for WNP-1 and HGP. Apparent increase is due to lower than planned expenses in FY 1989. ($214,159)	Continue to fulfill contractual obligations of WNP-1 and HGP. ($214,300)

III. Activity Description: Energy Resources - Expense (continued)

Program Activity	FY 1989	FY 1990	FY 1991
WNP-2	Continued to acquire full capability of WNP-2 (debt service, $222,534; operations $171,741; NEIL II insurance, $1,820; prepaid expense, $4,326). ($400,421)	Continue to acquire capabilities of 100% of WNP-2 (debt service, $221,500; operations, $211,000). Increase is due to capital replacements and increased cost of NRC compliance activities. ($432,500)	Continue to acquire capabilities of 100% of WNP-2 (debt service, $222,700; operations, $226,800). Increase over FY 1990 is due to three rotor replacements and new control room simulator. ($449,500)
WNP-3	Continued to fulfill contractual obligations (debt service, $159,938; preservation, $5,403; IOU settlement, $5,342; prepaid expense, $-551). ($170,132)	Continue to fulfill contractual obligations for WNP-1, HGP, and WNP-3. Increased costs are due to reductions from planned expenses for FY 1989. ($173,900)	Continue to fulfill contractual obligations. ($174,100)
Large Thermal Oversight and Legal Services	Provided oversight of large thermal generating plants from which BPA purchases capability to insure that all BPA approval rights are protected; coordinated, communicated and administered agreements, issues, and programs between BPA and the project owners. Provided litigation support to the Department of Justice (DOJ) relating to BPA's large thermal acquisition such as the Supply System. Reflects the MDL-551 settlements of $20,000. ($24,028)	Provide oversight of large thermal generating plants from which BPA purchases capability to insure that all BPA approval rights are protected; coordinate, communicate and administer agreements, issues, and programs between BPA and the project owners. Provide litigation support to the DOJ relating to BPA's large thermal acquisition such as the Supply System. Decreased cost due to no MDL-551 settlement and associated requirements. ($2,600)	Provide oversight of large thermal generating plants from which BPA purchases capability to insure that all BPA approval rights are protected; coordinate, communicate and administer agreements, issues, and programs between BPA and the project owners. Provide litigation support to the DOJ relating to BPA's large thermal acquisition such as the Supply System. ($2,600)
Resource Planning	Produced annual medium-term and long-term load and economic forecasts for the Pacific Northwest. Supported BPA bulk power and end-use marketing programs. Defined system operating changes such as changes in flow, spill and reservoir levels to evaluate the environmental	Produce annual medium-term and long-term load and economic forecast. Support BPA bulk power and end-use marketing programs. Define system operating changes such as changes in flow, spill and reservoir levels to evaluate the environmental impacts of BPA policies and decisions.	Produce annual medium-term and long-term load and economic forecast. Support BPA bulk power and end-use marketing programs. Define system operating changes such as changes in flow, spill and reservoir levels to evaluate the environmental

III. Activity Description: Energy Resources - Expense (continued)

Program Activity	FY 1989	FY 1990	FY 1991
Resource Planning (continued)	impacts of BPA policies and decisions. Defined the economic benefits of various BPA marketing alternatives. Provided economic analyses on a variety of issues in support of overall BPA marketing strategy. Conducted negotiations with other U.S. and Canadian utilities for more efficient operation of the Columbia River Hydroelectric System and administered provisions of the Columbia River Treaty. Planned and coordinated activities including strategic agency planning, strategic resource planning, and joint planning efforts with the Northwest Power Planning Council. Supported and prepared documents for Supply System refinancing. Assessed potential for conservation in all sectors and for generation; evaluated impacts of programs and their implementation processes; and conducted analyses of end-use consumption of electric power through projects such as the End-Use Load and Conservation Assessment Project (ELCAP). ($16,327)	Define the economic benefits of various BPA marketing alternatives. Provide economic analyses on a variety of issues in support of overall BPA marketing strategy. Conduct negotiations with other U.S. and Canadian utilities for more efficient operation of the Columbia River Hydroelectric System and administer provisions of the Columbia River Treaty. Support renegotiation of the Pacific Northwest Coordination Agreement. Plan and coordinate activities including strategic resource planning, development of the 1990 Resource Program for future budget decisions on purchase of conservation and generation resources. Provide BPA input to development of new plan by the Northwest Power Planning Council. Assess potential for conservation in all sectors and for generation; evaluate impacts of programs and their implementation processes; and conduct analyses of end-use consumption of electric power through projects such as ELCAP. The FY 1990 increase in funding over FY 1989 is due to increases in funding in the areas of: marketing, environmental rate support; planning and economic analysis; load forecasting; analyzing issues associated with Columbia River Treaty/Intertie economics; and ADP costs. ($19,000)	impacts of BPA policies and decisions. Define the economic benefits of various BPA marketing alternatives. Provide economic analyses on a variety of issues in support of overall BPA marketing strategy and efficient operation of the Columbia River Hydroelectric System. Administer the provisions of the Columbia River Treaty. Support renegotiation of the Pacific Northwest Coordination Agreement. Plan and coordinate activities including strategic resource planning and respond to workplans to accomplish the Council's Plan objectives. Assess potential for conservation and generation in all sectors; evaluate impacts of programs and their implementation processes; and conduct analyses of end-use consumption of electric power. ($18,900)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Transmission System Development - Operating Expense

Provides support to the Transmission System Development and System Maintenance Programs through in-house power transmission research and development (R&D) efforts. Other support activities, such as planning, budgeting and project scheduling are provided to the Transmission System Development Program. In-house R&D is primarily applications development for specific program needs of the BPA Power System. FY 1991 in-house efforts will focus on: 1) developing improved, reduced cost alternatives for meeting power transmission and analysis needs, particularly the unique needs of the PNW-PSW interties; 2) extending the useful life and capacity of existing facilities; 3) increasing the effectiveness of BPA's system operations and maintenance program; 4) assuring the safety and reliability of the power transmission system; (5) investigating the impacts of BPA's programs, technologies, and facilities to assure environmental compatability; and (6) investigating emerging technologies, such as superconductivity and artificial intelligence, to determine possible applications on the BPA System.

During FY 1989 this program also included accounting adjustments resulting from an analysis of outstanding capital work orders to determine whether they should be expensed. Few adjustments are expected after FY 1989, because activities previously expensed through accounting adjustments are now budgeted as expensed obligations.

The planned capital investments for the Transmission System Development Program are found in a separate key activity summary. Funding for BPA's participation in the Electric Power Research Institute (EPRI), budgeted in this program through the FY 1989 Budget, was moved to the agency overheads so that the cost could be distributed to all benefitting programs.

II. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Transmission R&D and Program Support	19,647	11,300	11,800	+4
Capital to Expense Adjustments	7,813	0	0	0
TOTAL	27,460	11,300	11,800	+4

III. Activity Description: Transmission System Development - Expense

Program Activity	FY 1989	FY 1990	FY 1991
Transmission R&D and Program Support	Conduct in-house transmission system research and development including: characterizing electric and magnetic fields from BPA facilities, intertie enhancement, HVDC insulation, and power system control improvements. Provide general program support activities such as planning, budgeting, scheduling, etc. ($19,647)	Conduct in-house transmission system research and development. Conduct studies on electro-magnetic fields and HVDC outage reduction. Develop methods to uprate existing facilities and reduce maintenance costs. Investigate artificial intelligence/expert systems. Provide general program support activities, such as planning, budgeting, scheduling, etc. ($11,300)	Conduct in-house Transmission System research and development. Conduct studies on electro-magnetic fields and DC substation insulation. Continue investigation of artificial intelligence/expert systems. Provide general program support activities, such as planning, budgeting, scheduling, etc. ($11,800)
Capital to Expense Adjustment	Annually, BPA analyzes its outstanding capital work orders to assess whether they should be expensed. This year's analysis identified approximately $8 million of work orders that were expensed. ($7,813)	No significant accounting adjustments are expected. ($0)	No significant accounting adjustments are expected. ($0)

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: System Maintenance - Operating Expense

The System Maintenance Program provides for the preventive and corrective maintenance of BPA's electric power transmission system including: high-voltage transmission lines, substations and related equipment, control systems, BPA-owned or leased real property, and non-electric facilities.

For several years, BPA has constrained its maintenance program due to overall cost pressures on its rates. A backlog of about 11,000 maintenance tasks has resulted. BPA has now begun a "catch up" drive to reduce the maintenance backlog and increase its preventive maintenance. During FY 1990, a new long-term maintenance plan will be completed, including alternatives for bringing all previously deferred maintenance back on schedule. Management will then make decisions about how to further pursue catch-up activities, and on what schedule.

II. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Transmission Line Maintenance	21,665	23,800	25,000	+5
Substation Maintenance	22,500	24,600	25,700	+4
System Protection Maintenance	8,015	8,800	9,200	+5
Power System Control Maintenance	12,090	13,100	14,300	+9
Non-Electric Plant Maintenance	5,505	6,300	6,500	+3
Maintenance Standards & Engineering	7,523	8,600	8,600	0
Pollution Control/Abatement	1,877	5,500	5,800	+5
TOTAL	79,175	90,700	95,100	+5

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III. Activity Description: System Maintenance - Expense

Program Activity	FY 1989	FY 1990	FY 1991
Transmission Line Maintenance	This activity includes the patrol and maintenance of over 14,727 circuit-miles of transmission lines throughout the power system. It includes performing emergency repairs to the transmission lines and structures, maintaining right-of-ways with danger tree and brush control, and access road repair and maintenance. ($21,665)	The activities remain the same as stated for FY 1989. ($23,800)	The activities remain the same as stated for FY 1990. The increase over the FY 1990 level is due to the third year of a 3-year increase to achieve 100% of preventive maintenance program performance. ($25,000)
Substations Maintenance	This activity includes the preventive and corrective maintenance of equipment at 387 substations and related facilities, and of circuit breakers, transformers, capacitors, and switches. Scheduled preventive maintenance increases system reliability and reduces costly catastrophic equipment failures. Corrective maintenance restores normal system operating conditions and will be accomplished as needed. Includes removal of PCB contaminated equipment and repair leaking equipment. ($22,500)	The activities remain the same as stated for FY 1989. Increase in funding is due to system expansion, higher costs, and the second year of a 3-year increase toward 100% of preventive maintenance program performance. ($24,600)	The activities remain the same as stated for FY 1990. The increase over the FY 1990 level is due to the third year of a 3-year increase to achieve 100% of preventive maintenance program performance. ($25,700)
System Protection Maintenance	This activity includes preventive and corrective maintenance of all control systems, including digital-based systems, d-c control systems or power system relays to insure no increase in customer outage rates or major equipment damage. Also includes maintenance of the meters necessary to record the operation of the power system and record demand and energy deliveries for billing purposes. ($8,015)	The activities remain the same as stated for FY 1989. Increase in funding is due to system expansion, higher costs, and the second year of a 3-year increase toward 100% of preventive maintenance program performance. ($8,800)	The activities remain the same as stated for FY 1990. The increase over the FY 1990 level is due to inflation and the third year of a 3-year increase to achieve 100% of preventive maintenance program performance. ($9,200)

III. Activity Description: System Maintenance - Expense (continued)

Program Activity	FY 1989	FY 1990	FY 1991
Power System Control Maintenance	This activity includes preventive and corrective maintenance of power line carriers, radio, digital and submultiplex systems and microwave equipment. The PSC program is a corrective maintenance program assuring timely restoration of service, proper relaying and secure control actions. ($12,090)	The activities remain the same as stated for FY 1989. Increase in funding is due to system expansion, higher costs, and the second year of a 3-year increase toward 100% of preventive maintenance program performance. ($13,100)	The activities remain the same as stated for FY 1990. The increase over the FY 1990 level is due to the third year of a 3-year increase to achieve 100% of preventive maintenance program performance. ($14,300)
Non-Electric Plant Maintenance	This activity includes site, building and building utility maintenance; custodial services; station utility; transportation maintenance; land management and operation; and other maintenance service activities on BPA-owned or leased non-electric facilities associated with the electric transmission system. ($5,505)	The activities remain the same as stated for FY 1989. ($6,300)	The activities remain the same as stated for FY 1990. The increase over the FY 1990 level is due primarily to increased activity toward achievement of full performance of scheduled preventive maintenance. ($6,500)
Maintenance Standards & Engineering	This activity includes updating and establishing standards, policies and procedures for system maintenance, as well as reviewing and developing a system-wide, long-range maintenance plan. ($7,523)	The activities remain the same as stated for FY 1989 with increased emphasis on completing and implementing a system-wide, long-range maintenance plan. ($8,600)	The activities remain the same as stated for FY 1990. ($8,600)
Pollution Control and Abatement	This activity consolidates non-capitalized environmental functions. It includes environmental and pollution abatement program evaluation and development, planning and review, environmental inventory and investigation, prevention/remedial actions such as the de-	The activities are as stated in the FY 1989 column. The increase in funding is due to scheduled site clean-up efforts and CERCLA site investigations. ($5,500)	The activities remain the same as stated in the FY 1990 column. ($5,800)

III. Activity Description: System Maintenance - Expense (continued)

Program Activity	FY 1989	FY 1990	FY 1991
Pollution Control and Abatement (continued)	contamination of equipment and oil, the repair of leaking equipment, inspection and removal of contaminated earth and liquids and the devlopment of decontamination methods and devices in substations. The activity also prepares guidance and provides training relevant to the above. ($1,877)		

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Fish and Wildlife - Operating Expense

Provides for protection, mitigation and enhancement of Columbia River Basin fish and wildlife affected by the development and operation of hydroelectric projects on the Columbia River and its tributaries pursuant to Section 4(h) of the Pacific Northwest Power Act. BPA discharges a major portion of its fish and wildlife responsibilities and reduces the Administrator's obligation by funding projects and activities designed to carry out the intent of the Northwest Power Planning Council's (Council) Fish and Wildlife Program. BPA's fish and wildlife expense activities include resource studies and evaluation, facility planning, and facility operation and maintenance, as well as minor construction (i.e., a facility costing less that $1 million, with an economic life of less than 15 years). The upward funding trend reflects the maturity of the program with increased funding supporting implementation of the Council's 1987 and 1989 Fish and Wildlife Program amendments and operation and maintenance of completed capital projects.

II. Summary Table:

Program Activity	FY 1989	FY 1990 1/	FY 1991 1/	% Change
Anadromous Fish	23,677	23,900	26,400	+10
Resident Fish	2,579	1,900	2,500	+32
Wildlife	181	5,200	5,000	-4
O&M	112	600	1,800	+200
TOTAL	26,549	31,600	35,700	+13

1/ These amounts do not reflect all of the recent reductions made during the fourth quarter of FY 1989 and displayed in the October 1989 Master Table of "Summary of Program Costs" prepared for BPA's Programs in Perspective.

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III. Activity Description: Fish and Wildlife - Expense

Program Activity	FY 1989	FY 1990	FY 1991
Anadromous Fish	Continue NW Power Act responsibilities and Council Program funding based upon FY 1987 and prior measures. Continue development of habitat/passage, downstream passage, disease reduction, and artificial production improvement methods. Includes funding ($3,600) for certain projects scheduled, but not funded in 1988 in the areas of downstream migration, fish health and habitat/passage improvements. (Total $23,677)	Continue efforts initiated in FY 1989 and prior years in habitat/passage, downstream passage, disease reduction and artificial production improvement methods. Funding reflects no adjustments for prior year unfunded projects. ($23,900)	Continue efforts initiated in FY 1990 and prior years, including 1987 amendments to the Fish and Wildlife program and begin a limited number of new efforts. Increase reflects Council program priorities. ($26,400)
Resident Fish	Continue ongoing studies of reservoir operation effects on fish. Continue in-stream flow studies and white sturgeon habitat requirements. ($2,579)	Continue efforts initiated in FY 1988 and prior years. Funding level reflects Council program priorities. ($1,900)	Continue efforts initiated in FY 1989 and prior years, including 1987 amendments to the Fish and Wildlife program. Increase reflects Council program priorities. ($2,500)
Wildlife Program	Conduct wildlife less assessments and further development of wildlife mitigation plans. Continue mitigation efforts in Montana for Libby and Hungry Horse Dams. ($181)	Continue FY 1989 program for development of wildlife mitigation plans. Increase due to anticipated effects of the 1989 amendments to Council's Fish and Wildlife program and the Montana Wildlife Trust Agreement's first of five annual payments. ($5,200)	Continue the FY 1990 program including funding the second of five annual payments into the Montana Wildlife Trust and initiation of further wildlife actions resulting from Council Wildlife Program amendments in 1989. ($5,000)
O&M	Funding reflects completion of fish capital projects funded by BPA. ($112)	Funding reflects completion of fish capital projects funded by BPA. ($600)	Increase reflects schedule of completed projects entering the O&M phase of implementation. ($1,800)

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BONNEVILLE POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

I. Preface: Capital Transfers

Capital Transfers are funds conveyed to the U.S. Treasury for repayment of certain Federal Columbia River Power System (FCRPS) costs not included in Interest and Associated Project Costs budgets. Capital transfers are cash transactions and, as such, are not considered budget obligations. Starting in FY 1991, interest payments on BPA and Corps unpaid appropriations will be displayed in the budget as an operating expense. This reflects BPA's longstanding practice and is consistent with accepted accounting treatment of interest payments.

II. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
BPA Appropriation Interest	56,408	58,800		
Corps Appropriation Interest	118,876	131,300		
BPA Bond Amortization	150,000	153,100	176,300	+15
BPA Appropriation Amortization	688	0	0	
TOTAL	325,972	343,200	176,300	

III. Activity Description: Capital Transfers

Program Activity	FY 1989	FY 1990	FY 1991
BPA Appropriation Interest	Payments were made from the BPA Fund to the General Fund of the U.S. Treasury to repay interest due on appropriated	Continue interest payments on BPA appropriations debt incurred before self-financing. ($58,800)	

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III. Activity Description: Capital Transfers (continued)

Program Activity	FY 1989	FY 1990	FY 1991
BPA Appropriation Interest (continued)	funds used to finance BPA transmission facilities. These appropriations were made by Congress before enactment of BPA self-financing authority in 1974. ($56,408)		
Corp of Engineers Appropriation Interest	This item covers payments to the General Fund of the U.S. Treasury to repay the interest due on appropriated funds used to finance Corps of Engineers power generation facilities of the FCRPS. This item also includes a deferred interest payment made by the Corps on Lower Snake River projects and payment to the General Funds of the U.S. Treasury to repay interest due on appropriated funds used to finance Corps of Engineers' construction of mitigation hatchery facilities on the Lower Snake authorized by the Water Resources Development Act of 1976. ($118,876)	Change reflects interest costs of continued appropriations. ($131,300)	
BPA Bond Amortization	This item covered repayments to the U.S. Treasury to pay off the Federal investment in transmission facilities since 1974. This item also covered repayment of bonds issued in support of conservation and fish and wildlife since passage of the PNW Power Act in 1980. Amortization estimates are a direct function of program levels and new plant-in-service estimates. ($150,000)	Amortization estimates in FY 1990 are a direct function of program levels and new plant-in-service estimates. ($153,100)	Amortization estimates in FY 1991 are a direct function of program levels, and new plant-in-service estimtes. ($176,300)

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III. Activity Description: Capital Transfers (continued)

Program Activity	FY 1989	FY 1990	FY 1991
BPA Appropriation Amortization	This item covered payments to the U.S. Treasury to repay appropriations. ($688)	No amortization is scheduled. ($0)	No amortization is scheduled. ($0)

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CURRENT SERVICES
DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
(dollars in thousands)

BONNEVILLE POWER ADMINISTRATION FUND
Object Classification Statement

Identification Code: 89-4045-0-3-271
Direct Obligations:

Personnel compensation:	1989 ACTUAL	1990 ESTIMATE	1991 ESTIMATE
11.1 Full-time permanent	96,397	98,000	100,400
11.3 Other than full-time permanent	3,605	2,400	1,300
11.5 Other personnel compensation	4,823	7,200	7,500
11.8 Special personal services payments	19,818	20,000	20,300
11.9 Total personnel compensation	124,643	127,600	129,500
12.1 Personnel benefits: Civilian	23,799	24,100	24,400
13.0 Benefits to former personnel	0	0	0
21.0 Travel and transportation of persons	6,888	7,500	7,800
22.0 Transportation of things	4,949	5,200	5,400
23.1 Rental payments to GSA	8,976	9,150	10,000
23.3 Communications, utilities, and miscellaneous charges	4,307	5,600	4,700
24.0 Printing and reproduction	925	1,000	1,100
25.0 Other services	2,018,629	2,200,009	2,276,400
26.0 Supplies and materials	16,961	25,500	26,600
31.0 Equipment	44,837	68,300	51,200
32.0 Lands and structures	5,341	9,700	10,000
41.0 Grants, subsidies, and contributions	30,352	27,600	28,700
42.0 Insurance claims and indemnities	699	300	100
43.0 Interest and dividends	170,386	149,300	330,700
44.0 Refunds	0	0	0
99.0 Subtotal, direct obligations	2,461,692	2,660,859	2,906,600
99.0 Reimbursable obligations	50,328	102,600	104,300
99.9 Total obligations	2,512,020	2,763,459	3,010,900

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VOLUME 4

SOUTHEASTERN POWER ADMINISTRATION

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
SOUTHEASTERN POWER ADMINISTRATION
OPERATION AND MAINTENANCE

PROPOSED APPROPRIATION LANGUAGE

For necessary expenses of operation and maintenance of power transmission facilities and of marketing electric power and energy pursuant to the provisions of section 5 of the Flood Control Act of 1944 (16 U.S.C. 825s), as applied to the southeastern power area, [$18,456,000] $9,285,000, to remain available until expended.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
SOUTHEASTERN POWER ADMINISTRATION

OVERVIEW

SOUTHEASTERN POWER ADMINISTRATION

Southeastern Power Administration's (Southeastern) power marketing program is vital to the transmission and disposition of Federal hydroelectric power in the Southeast in a fair and orderly manner. The power produced at 22 hydroelectric projects located throughout the Southeast makes an important contribution to the peaking power requirements of the area. Twenty utilities in the area depend upon Southeastern power to carry load, provide reserves, and help meet emergency conditions. The program is structured to:

- Encourage widespread use of available Federal power.
- Make the power available at the lowest possible rates to consumers consistent with sound business principles.
- Formulate power rates to recover all costs of producing and transmitting power including amortization of capital investment allocated to power over a 50-year period.
- Give preference in the sale of power to public bodies and cooperatives.
- Utilize existing area transmission facilities to accomplish transmission of power to customers.
- Integrate projects to the maximum feasible extent and operate projects to provide maximum power contribution in meeting area power requirements.
- Encourage development of additional hydroelectric power projects that are economically and environmentally feasible.

Southeastern markets hydroelectric power produced at Corps of Engineers' constructed projects in the States of West Virginia, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, and Kentucky; and, in accordance with the Flood Control Act of 1944, gives preference in the sale of such power to public bodies and cooperatives.

Southeastern does not own or operate any transmission facilities. In the absence of transmission facilities of its own, Southeastern carries out its marketing program by utilizing the existing transmission systems of the

power utilities in the area. This is accomplished through "wheeling" arrangements between Southeastern and each of the area utilities with transmission lines connected to the projects under which the utility agrees to deliver specified amounts of Federal power to customers of the Government, and Southeastern agrees to compensate the utility for the wheeling service performed.

Southeastern's power marketing policies for its respective systems anticipate that all available power, both capacity and energy, will ultimately be sold to preference customers with no sales to the non-preference utilities who provide wheeling services. Southeastern is progressing as rapidly as possible to negotiate and execute contractual arrangements implementing the policies.

The major program activities Southeastern expects to perform in accomplishing its mission objectives include:

- Develop marketing plans, and negotiation strategies and negotiate contracts to integrate into the system new resources from pump units at the Richard B. Russell project, which are now scheduled for generation during the early 1990's. Additionally, Southeastern will develop arrangements for the supply of pumping energy at Carters Project by preference customers within the Georgia-Alabama system in accordance with Southeastern's published power marketing policy. Accomplishment of this initiative presents a unique and extremely complex situation involving several utility systems and numerous preference customers.

- Continue to administer approximately 300 contracts which benefit more than 500 customers in a fair and effective manner that carries out the intent of contract provisions. This objective includes power delivery, contract service, billing and collection functions and daily coordination of reservoir operations to maximize power output and meet firm power commitments.

- Encourage development of additional hydroelectric power projects that are economically and environmentally feasible. In coordination with the Corps of Engineers, Southeastern is engaged in analyzing the financial feasibility of potential hydroelectric resources.

- Continue to work with the Corps of Engineers and preference customers on proposed project updates and on new projects. Five projects in the Cumberland System are being evaluated for the installation of new and perhaps larger units and others for additional generating units.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
SOUTHEASTERN POWER ADMINISTRATION
(dollars in thousands)

LEAD TABLE

Southeastern Power Administration

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Operation and Maintenance						
Operating Expenses	$ 2,647	$ 2,324	$ 2,324	$ 2,624	$ +300	+13%
Purchase Power and Wheeling	33,620	16,132	16,132	17,661	+1,529	+9%
Total Operations and Maintenance	$36,267	$18,456	$18,456	$20,285	$ 1,829	+22%
Continuing Fund	$ 0	$ 0	$ 0	$ 0	$ 0	0%
Total Southeastern Power Administration	$36,267	$18,456 1/	$18,456	$20,285	$ 1,829	+22%
Use of Unobligated Balances				-11,000		
New Budget Authority Requested				$ 9,285		
Staffing						
Total (FTE's)	38	40	40	40		

Authorization:
- Section 5, "Flood Control Act of 1944" (16 U.S.C. 825s and 825s-2)
- Section 302 of "Department of Energy Organization Act" (42 U.S.C. 7152)

1/ FY 1990 reflects final Gramm-Rudman-Hollings Sequester adjustment and P.L. 101-164 reductions to fund anti-drug activities.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

SUMMARY OF CHANGES

Southeastern Power Administration

FY 1990 Appropriation	$ 18,456
Adjustments	0
FY 1991 Base	$ 18,456
Operations and Maintenance	
- Personnel Compensation and Related Costs	+ 82
- Increases in Support Functions	+ 218
Purchase Power and Wheeling	
- Increased Contractual Requirements	+ 1,529
FY 1991 Request	$ 20,285
Use of Unobligated Balances	- 11,000
FY 1991 Congressional Budget Request	$ 9,285

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DEPARTMENT OF ENERGY
FY 1981 CONGRESSIONAL BUDGET REQUEST
OPERATION & MAINTENANCE, SOUTHEASTERN POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

SOUTHEASTERN POWER ADMINISTRATION

I. Preface: Operation and Maintenance

The activity provides for: (1) scheduling the generation of power and supervision of power deliveries; (2) negotiation and administration of contracts for the sale of power and energy and establishment of rates to assure repayment of power costs; and (3) general administration and support of Southeastern's power marketing program.

II. A. Summary Table: Operation and Maintenance

Program Activity	FY 1980 Actual	FY 1980 Estimate	FY 1981 Request	% Change
Operation and Maintenance	$ 2,647	$ 2,324	$ 2,624	+ 13
Total, Operation and Maintenance	$ 2,647	$ 2,324	$ 2,624	+ 13

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Operation and Maintenance			
Operation and Maintenance	Continue the power marketing program in the Southeast at the FY 1988 level. Continue negotiations with wheeling agents and existing and new preference customers to complete marketing arrangements implementing the Cumberland Basin Marketing Policy. Pursue development of marketing plans, and negotiation strategies, pertaining to the disposition of future power from the pump units at the Richard B. Russell project which are scheduled to be on line during the early 1990's. Southeastern will also engage in the development of arrangements for the supply of pumping energy at the Carters project by preference customers in the Georgia-Alabama System. Develop marketing arrangements for the disposition of power from the Brookville, Stonewall Jackson, and Emsworth projects, projects for which Southeastern has been assigned marketing responsibility.	Continue the power marketing program in the Southeast with 40 FTE. Continue remaining negotiations to complete implementation of the Cumberland System Marketing Policy; complete negotiations concerning marketing power from the Brookville, Stonewall Jackson and Emsworth projects. Initiate negotiation of arrangements for the supply of pumping energy at Carters project by preference customers. Continue to explore different approaches pertaining to the disposition of future power from the pump units at the Richard B. Russell project which are scheduled to be on line during the early 1990's These studies will include intensive evaluation of legal avenues and issues regarding a new marketing situation. Accomplishment of these activities presents a unique and extremely complex situation involving several utility systems and numerous preference customers.	Continue the power marketing program in the Southeast with 40 FTE. Complete any remaining negotiations to implement the Cumberland System Marketing Policy; continue negotiation of arrangements for the use of pumping energy at the Carters project by preference customers in the western portion of the Georgia-Alabama System; pursue negotiations pertaining to the disposition of future power from the pump units at the Richard B. Russell project scheduled to begin generation during the early 1990's.
	Maintain power billing, collection, and payment functions under approximately 300 contracts which will benefit more than 500 preference customers; prepare financial and marketing analyses with respect to existing and potential projects; and coordinate power operations of 22 operating projects with Corps of Engineers Division and District offices, and scheduling utilities, making determinations of capacity and energy availability weekly to arrive at quantities available to meet contractual commitments from the	Maintain power, billing, collection, and payment functions under approximately 300 contracts which will benefit more than 500 preference customers; prepare financial and marketing analyses with respect to existing and potential projects; and coordinate power operations of 22 operating projects with Corps of Engineers Division and District offices, and scheduling utilities, making determinations of capacity and energy availability weekly to arrive at quantities available to meet	Maintain power billing, collection, and payment functions for more than 300 contracts which will benefit more than 500 preference customers; pre-plan financial and marketing analyses with respect to existing and potential projects; and coordinate power operations of 22 operating projects with Corps of Engineers Division and District offices, and scheduling utilities, making determinations of capacity and energy availability weekly to arrive at quantities available to meet contractual commitments from the

III. Operation and Maintenance (Cont'd):

Program Activity	FY 1988	FY 1989	FY 1991
Operation and Maintenance (Cont'd)	various projects. Perform continuing review of actual project operations to assure that computer simulations correspond to actual operating conditions and to assure that maximum production is obtained from the water available.	contractual commitments from the various projects. Perform continuing review of actual project operations to assure that computer simulations correspond to actual operating conditions and to ensure that the projects provide the optimum benefit to Southeastern customers and to the region as well as serve other project functions.	various projects. Perform continuing review of actual project operations to assure that computer simulations correspond to actual operating conditions and to ensure that the projects provide the optimum benefit to Southeastern customers and to the region as well as serve other project functions.
	Prepare repayment analyses of each System to reflect expected financial results for the remainder of each system's repayment period.	Prepare repayment analyses of each System to reflect the rates required to achieve full appropriated debt repayment by the end of each system's repayment period and make a formal rate presentation for the Georgia-Alabama System.	Prepare repayment analyses of each System to reflect the rates required to achieve full appropriated debt repayment by the end of each system's repayment period and make a formal rate presentation for the Karr-Philpott System.
	Water supply, water quality, recreation, and other nonpower uses will involve discussions, studies, and meetings with affected groups. Southeastern has the responsibility to ensure that power interest is heard since nonpower uses have the potential of reducing water available for power generation. Competing demands for water use are expected to be intense and to further impact the power potential of the projects.	Water supply, water quality, recreation, and other nonpower uses will involve discussions, studies, and meetings with affected groups. Southeastern has the responsibility to ensure that power interest is heard since nonpower uses have the potential of reducing water available for power generation. Competing demands for water use are expected to be intense and to further impact the power potential of the projects.	Competing demands for water use are expected to continue to be intense and to further impact power potential of projects for which Southeastern has marketing responsibility. Discussions, studies, and meetings with affected groups will continue as Southeastern carries out its responsibility to ensure that the power interest is heard.

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III. Operation and Maintenance (Cont'd):

Program Activity	FY 1980	FY 1980	FY 1981
Operation and Maintenance (Cont'd)	Analyze the financial feasibility of the potential hydroelectric resources in the ten Southeastern states within which Southeastern has marketing responsibility as well as selected projects outside the area for which Southeastern has been assigned responsibility. Evaluate a number of existing projects in the Cumberland River Basin for upgrading equipment.	Analyze the financial feasibility of the potential hydroelectric resources in the ten Southeastern states within which Southeastern has marketing responsibility as well as selected projects outside the area for which Southeastern has been assigned responsibility. Evaluate a number of existing projects in the Cumberland River Basin for upgrading equipment.	Analyze the financial feasibility of the potential hydroelectric resources in the ten Southeastern states within which Southeastern has marketing responsibility as well as selected projects outside the area for which Southeastern has been assigned responsibility. Two projects in the Cumberland Basin are expected to be studied for the addition of generating units. Studies, evaluations and discussions concerning replacement or upgrade of equipment at a number of existing projects in all four of Southeastern's marketing systems are expected to be active.
	$ 2,647	$ 2,324	$ 2,824
Operation and Maintenance	$ 2,647	$ 2,324	$ 2,824

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DEPARTMENT OF ENERGY
FY 1981 CONGRESSIONAL BUDGET REQUEST
OPERATION & MAINTENANCE, SOUTHEASTERN POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

SOUTHEASTERN POWER ADMINISTRATION

I. Preface: Purchase Power and Wheeling

The activity provides for payment of amounts charged the Government under contractual arrangements for: (1) delivery of power over non-Federal systems to load centers of preference customers for the account of the Government, (2) purchase by the Government of energy to firm up Federally-generated power during adverse water periods, and (3) to provide support capacity required to meet commitments for the Jim Woodruff Project under adverse water conditions.

II. A. Summary Table: Purchase Power and Wheeling

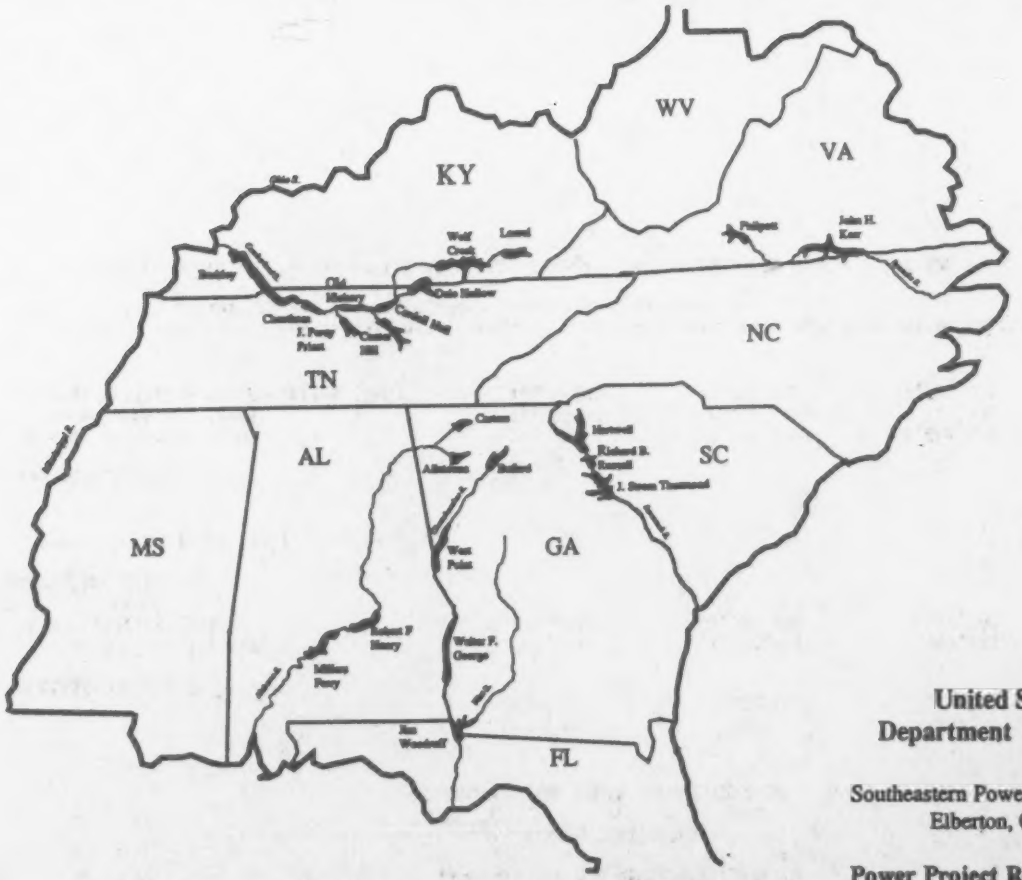
Program Activity	FY 1980 Actual	FY 1980 Estimate	FY 1981 Request	% Change
Purchase Power and Wheeling	$ 33,620	$ 16,132	$ 17,661	+ 9
Total, Purchase Power and Wheeling	$ 33,620	$ 16,132	$ 17,661	+ 9

1981

III. Activity Descriptions: (Row BA in thousands of dollars)

Program Activity	FY 1980	FY 1980	FY 1981
Purchase Power and Wheeling	Provide for payment of transmission service charges for delivery of power over non-federal systems to load centers of preferred customers under contractual arrangements expected to be in place; provide for purchase of energy to provide support capacity required to meet commitments for Jim Woodruff project under adverse conditions.	Provide for payment of transmission service charges for delivery of power over non-federal systems to load centers of preferred customers under contractual arrangements expected to be in place except under extreme drought conditions, and for purchase of energy to provide support capacity required to meet commitments for the Jim Woodruff project under adverse conditions.	Provide for payment of transmission service charges for delivery of power over non-federal systems to load centers of preferred customers under contractual arrangements expected to be in place except under extreme drought conditions, and for purchase of energy to provide support capacity required to meet commitments for the Jim Woodruff project under adverse conditions.
	$ 33,020	$ 16,132	$ 17,661
Purchase Power and Wheeling	$ 33,020	$ 16,132	$ 17,661
Total Southeastern Power Administration	$36,267	$18,456	$20,285

1982



United States
Department of Energy

Southeastern Power Administration
Elberton, Georgia

Power Project Responsibilities

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY

SYSTEM STATISTICS

SOUTHEASTERN POWER ADMINISTRATION

	1989 Actual	1990 Estimate	1991 Estimate
Generating Capacity:			
Installed Capacity (kW)	3,092,375	3,092,375	3,092,375
Peak Capacity (kW)	3,134,100	3,100,000	3,100,000
Generating Stations:			
Generating Projects (No.)	22	22	22
Available Energy:			
Energy Generated (MWh)	7,211,594	7,690,000	7,690,000
Energy Purchased (MWh)	192,267[a/]	10,000	10,000
Energy Available for Marketing (MWh)	7,403,861[b/]	7,700,000	7,700,000

a/ Due to drought conditions in this area, quantities of energy were purchased from interconnected utilities to support project capability and to meet minimum generation commitments.

b/ Includes transmission losses of 186,497 MWh. Energy marketed amounted to 7,217,364 MWh.

1984

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
POWER MARKETED, WHEELED OR EXCHANGED BY PROJECT

SOUTHEASTERN POWER ADMINISTRATION

Project Power Marketed	State	No. of Plants	Installed Capacity (kW)	FY 1989 Actual Power (GWH)	FY 1990 Estimated Power (GWH)	FY 1991 Estimated Power (GWH)
John H. Kerr	VA-NC	1	204,000			
Philpott	VA	1	14,000	478*	440*	440*
Allatoona	GA	1	74,000			
Buford	GA	1	86,000			
Carters	GA	1	500,000			
J. Strom Thurmond	GA-SC	1	280,000			
Walter F. George	GA-AL	1	130,000	2,619*	3,500*	3,500*
Hartwell	GA-SC	1	344,000			
R. F. Henry	AL	1	68,000			
Millers Ferry	AL	1	75,000			
West Point	GA-AL	1	73,375			
Richard B. Russell	GA-SC	1	300,000 1/			
Jim Woodruff	FL-GA	1	30,000	205	240	240
Barkley	KY	1	130,000			
Center Hill	TN	1	135,000			
Cheatham	TN	1	36,000			
Cordell Hull	TN	1	100,000	3,915*	3,260*	3,260*
Dale Hollow	TN	1	54,000			
Old Hickory	TN	1	100,000			
J. Percy Priest	TN	1	28,000			
Wolf Creek	KY	1	270,000			
Laurel	KY	1	61,000			
Total, Power Marketed		22	3,092,375	7,217	7,440	7,440

* Projects are integrated hydraulically, electrically, and financially for marketing purposes.

a/ In addition, four pump-turbines are scheduled to go into operation in FY 1991 bringing the total installed capacity to 600,000 KW. This date may be extended due to litigation on the installation of the pumped-storage units.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
SOUTHEASTERN POWER MARKETING ADMINISTRATION

REVENUES AND RECEIPTS
(dollars in thousands)

	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995
Southeastern Power Administration							
Gross Revenues	$134,043	$141,134	$175,341	$178,038	$179,846	$181,106	$182,366
Receipts:							
Sale and transmission of of electric energy	$119,393	$128,545	$162,953	$170,108	$171,811	$172,965	$174,120
Net billing amount credited as an offsetting receipt	$ 13,498	$ 12,705	$ 12,636	$ 7,930	$ 8,035	$ 8,141	$ 8,246
Percent of sales to preference customers 1/	95	95	96	99	99	99	99
Energy Sales from Power Marketed (billions of kilowatt hours)	7.2	7.2	7.4	7.4	7.4	7.4	7.4

1/ Includes TVA.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
SOUTHEASTERN POWER ADMINISTRATION -- CONTINUING FUND

	FY 1990 Estimated Budget Authority	FY 1991 Estimated Budget Authority
Continuing Fund		
Emergency Expenses	0	0
Total, Continuing Fund	0	0

Authorization: 16 U.S.C. 825s

Continuing Fund

The Southeastern Power Administration Continuing Fund of $50,000, a permanent, indefinite special fund, maintained from receipts for the transmission and sale of electric power in the Southeastern area, is available to defray emergency expenses necessary to insure continuity of service.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
SOUTHEASTERN POWER ADMINISTRATION
(Obligations in thousands of dollars)

OBJECT CLASS SUMMARY

Southeastern Power Administration

Direct Funding:		FY 1989	FY 1990	FY 1991
11.1	Full-time permanent	$1,379	$1,479	$1,481
11.3	Other than full-time permanent	14	12	12
11.5	Other personnel compensation	16	15	15
11.9	Total personnel compensation	1,409	1,506	1,508
12.1	Civilian personnel benefits	211	240	240
21.0	Travel and transportation of persons	96	105	110
22.0	Transportation of things	1	15	20
23.1	Rental payments to GSA	61	63	73
23.3	Communications, utilities, and miscellaneous charges	44	63	63
24.0	Printing and reproduction	3	8	8
25.0	Other services	36,558	29,930	30,661
26.0	Supplies and materials	48	55	57
31.0	Equipment	58	121	181
32.0	Land & structures	0	0	0
Totals		$38,489	$32,106	$32,921

1989

VOLUME 4

SOUTHWESTERN POWER ADMINISTRATION

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
SOUTHWESTERN POWER ADMINISTRATION

PROPOSED APPROPRIATION LANGUAGE

For necessary expenses of operation and maintenance of power transmission facilities and of marketing electric power and energy, and for construction and acquisition of transmission lines, substations, and appurtenant facilities, and for administrative expenses, including official reception and representation expenses in an amount not to exceed $1,500 connected therewith, in carrying out the provisions of Section 5 of the Flood Control Act of 1944 (16 U.S.C. 825s), as applied to the southwestern power area, [$25,172,000], $20,107,000 to remain available until expended; in addition, notwithstanding the provisions of 31 U.S.C. 3302, not to exceed [$11,723,000], $8,899,000 in reimbursements, to remain available until expended: Provided, that the continuing fund established by the Act of October 12, 1949, c.680, title I, section 101, as amended shall also be available on an ongoing basis for paying for purchased power and wheeling expenses when the Administrator determines that such expenditures are necessary to meet contractual obligations for the sale and delivery of power during periods of below average hydropower generation. Payments from the continuing fund shall be limited to the amount required to replace the generation deficiency, and only for the project where the deficiency occurred. Replenishment of the fund shall occur within the twelve months of the month in which funds were first expended.

1991

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY

OVERVIEW

SOUTHWESTERN POWER ADMINISTRATION

MISSION

Southwestern Power Administration (SWPA) markets hydroelectric power generated at Federal dams, at lowest possible rates consistent with sound business principles, giving preference in the sale to public bodies and cooperatives. SWPA schedules the operation of the Corps of Engineers' (COE) generating facilities for optimum resource utilization. SWPA designs, constructs, and operates its transmission facilities in a safe reliable manner, consistent with good utility practices. SWPA facilitates the development of environmentally clean renewable resources and energy conservation practices. In carrying out its mission, SWPA conducts business in an open manner with customers, employees, the Department of Energy, the Congress, and the general public.

FUNCTIONS

1. Markets and delivers all hydroelectricity to preference customers.

2. Manages its activities to ensure financial integrity, rate adequacy and equity, and cost effectiveness.

3. Constructs, upgrades, maintains, and operates its transmission system to assure the safe, reliable delivery of power to its customers.

4. Seeks to increase national economic benefits through regional power exchanges and through effective integration of regional thermal and renewable generation resources.

5. Facilitates development of economically feasible and environmentally acceptable Federal and non-Federal renewable hydro power resources.

6. Utilizes reimbursable activity to support the ever-changing needs of preference customers.

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PROGRAMS AND OBJECTIVES

OPERATIONS AND MAINTENANCE program objectives are: (1) Improve efficiency of operations, enhance productivity, and increase system reliability, (2) Market power on a basis which maintains an acceptable level of repayment, and (3) Facilitate the development of Federal hydroelectric projects that are economically and environmentally feasible.

PURCHASE POWER AND WHEELING program objectives are: (1) Maintain low energy commitments under power sales contracts, (2) Utilize extensive energy banking arrangements to minimize direct purchases of energy, (3) Retain reimbursable authority in two areas, military customers, and Oklahoma municipal customers, to maintain lower purchase power and wheeling funding requests, (4) Continue to reduce the need for reimbursable authority by modifying contractual arrangements, where possible, to require Oklahoma municipal and military customers to compensate investor-owned utilities directly for energy purchases, and (5) Request authority to utilize the continuing fund to cover necessary purchase power and wheeling expenses when hydro generation is below normal.

CONSTRUCTION program objectives are: (1) Maintain and enhance power transmission system safety and reliability, thereby insuring continued safe, reliable delivery of power to our preference customers, (2) Encourage new initiatives for more effective use of existing regional generation resources, and (3) Facilitate development of new non-Federally funded hydroelectric generation resources.

1993

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

LEAD TABLE

Southwestern Power Administration

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Southwestern Power Administration:						
Operations & Maintenance						
New Budget Authority	$ 9,551	$16,737	$16,737	$14,991	$ -1,746	- 10%
Use of Prior Year Balance	5,264	464	464	2,325	+1,861	+401%
Reimbursable Authority	0	100	100	200	+ 100	+100%
Total Operations and Maintenance Funding	$14,815	$17,301	$17,301	$17,516	+ 215	+ 1%
Purchase Power and Wheeling						
New Budget Authority	$ 0	$ 1,884	$ 1,884	$ 826	$ -1,058	- 56%
Use of Prior Year Balances	7,936	5,136	5,136	7,073	+1,937	+ 38%
Reimbursable Authority	6,841	7,123	7,123	4,199	-2,924	- 41%
Total Purchase Power/Wheeling Funding	$14,777	$14,143	$14,143	$12,098	$ -2,045	- 14%
Construction						
New Budget Authority	$ 5,838	$ 6,436	$ 6,436	$ 4,290	$ -2,146	- 33%
Use of Prior Year Balances	0	2,800	2,800	5,892	+3,092	+110%
Reimbursable Authority	1,000	4,500	4,500	4,500		
Total Construction Funding	$ 6,838	$13,736	$13,736	$14,682	$ + 946	+ 7%

LEAD TABLE

SOUTHWESTERN POWER ADMINISTRATION (CONT'D)

Activity	FY 1989	FY 1990	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Program Level						
Operations and Maintenance	$14,815	$17,301	$17,301	$17,516	$ +215	+1%
Purchase Power/Wheeling	14,777	14,143	14,143	12,098	-2,045	-14%
Construction	6,838	13,736	13,736	14,682	+946	+7%
Total Program	$36,430	$45,180	$45,180	$44,296	$ -884	-2%
Southwestern Power Administration Financing						
New Budget Authority	$ 15,389	$ 25,057	$ 25,057	$ 20,107	$ -4,950	- 20%
Use of Prior Year Balances	13,200	8,400	8,400	15,290 1/	+6,890	+ 82%
Reimbursable Authority	7,841	11,723	11,723	8,899	-2,824	- 24%
Grand Total SWPA Funding	$ 36,430	$ 45,180 2/	$ 45,180	$ 44,296	$ - 884	- 2%
Southwestern Power Administration Continuing Fund	$ 0	$ 0	$ 0	$ 0		
Staffing/Total (FTE's)	186	184	186	186		

Authorization:
- Section 5, "Flood Control Act of 1944" (16 U.S.C. 825s)

1/ Of the $25,542,000 of prior year funds available at the end of FY 1989, $8,400,000 is used to finance FY 1990 activities and $15,290,000 will be used to finance FY 1991.

2/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and P.L. 101-164 reductions to fund anti-drug activities.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
SOUTHWESTERN POWER ADMINISTRATION
(dollars in thousands)

SUMMARY OF CHANGES

Southwestern Power Administration

FY 1990 Appropriation		$ 33,457
Adjustment		+ 0
FY 1991 Base		33,457
FY 1990 Reimbursable Authority		11,723
FY 1990 Base		45,180
Operations and Maintenance		
- Increased activity in maintaining a 45 year old transmission system which covers 1,380 miles in three states	+	115
Purchase Power and Wheeling		
- The assumption that a greater percentage of system support requirements for FY 1991 will be met by direct thermal energy purchases and the inflationary increase in costs have resulted in an increase in the Purchase Power & Wheeling Budget Request for FY 1991	+	879
Construction		
- Increased activity in replacement of aging and obsolete equipment, and replacement of high maintenance equipment	+	946

1990

SUMMARY OF CHANGES

Southwestern Power Administration (Cont.)

Subtotal	47,120
Reimbursable Authority	
- Decrease in Purchase Power and Wheeling - Reimbursable Activity	- 2,824
FY 1991 Congressional Budget Request	$ 44,296

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OPERATION & MAINTENANCE, SOUTHWESTERN POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

SOUTHWESTERN POWER ADMINISTRATION

I. Preface: Operations and Maintenance

SWPA's operations and maintenance activity is designed to fulfill the statutory requirements of Section 5 of the Flood Control Act of 1944 in regard to marketing federally generated hydroelectric power and recovering the Federal investment with interest. SWPA also strives to achieve the objectives of National Energy Policy in fostering an adequate supply of energy at a reasonable cost. Federal energy and transmission systems are important catalysts for supporting the economic health of SWPA's service area. SWPA's operations and maintenance activity is committed to providing reliable service and economical energy in a safe, cost-effective manner. This goal is achieved by maintaining continuity of service through a well maintained power transmission system and by being responsive to the energy needs of preference customers while developing power marketing policies and contracts.

Program objectives are: (1) Improve efficiency of operations, enhance productivity, and increase system reliability; (2) Market power on a basis which maintains an acceptable level of repayment; and (3) Facilitate the development of Federal hydroelectric projects that are economically and environmentally feasible.

II. A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Operations and Maintenance	$ 14,815	$ 17,301	$ 17,516	+ 1
Reimbursable Authority	0	-100	-200	-100
Use of Deferred Funds	-5,264	-464	-2,325	-401
Total, Operations and Maintenance	$ 9,551	$ 16,737	$ 14,991	- 10

1998

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Operations and Maintenance	Market power and energy from 24 Corps hydroelectric plants at cost-based rates consistent with sound business principles, giving preference in the sale to public bodies and cooperatives. Facilitate financially feasible and environmentally acceptable Federal hydroelectric projects using non-Federal funding. A total of $14,815 includes a prior year deferal of $5,264 to fund operations and maintenance requirements.	Market power and energy from 24 Corps hydroelectric plants at cost-based rates consistent with sound business principles, giving preference in the sale to public bodies and cooperatives. Facilitate financially feasible and environmentally acceptable Federal hydroelectric projects using non-Federal funding. This level of funding would support an increase in salary and benefits implemented under Public Law 100-71, 1987, an increase in dispatchers salaries and benefits, and also the Public Law 100-202, 1987, increased salaries and benefits for wage board employees. This level of funding would support an increase in GSA rent, due to a move of SWPA's Tulsa headquarters office. This level of funding would meet SWPA's maintenance and contractual requirements by 100 percent. The total of $17,318 includes a prior year deferral of $464 to fund operations and maintenance requirements. non-Federal ($100)	Market power and energy from 24 Corps hydroelectric plants at cost-based rates consistent with sound business principles, giving preference in the sale to public bodies and cooperatives. Facilitate financially feasible and environmentally acceptable Federal hydro- electric projects using non-Federal funding. Provides Administrative oversight of the SWPA Mission (184 FTE). Manages the renewable hydroelectric power resources to meet contractual commitments. Schedules and operates the transmission system in a safe and reliable manner consistent with the requirements of the regional utility reliability council. Markets power to preference customers at rates which maintain an acceptable level of repayment. Maintains transmission system which covers 1,380 miles in three states. Improves efficiency of operations, enhances productivity, and manages an efficient maintenance program to increase system reliability. Maintains an ongoing program of transmission system facilities replacement and modernization to reduce unplanned outages, lower maintenance costs, and improve operating efficiency. Assures system enhancements to meet continuing load growth and reliability

III. Operations and Maintenance (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Operations and Maintenance (Cont'd)			requirements. Provides the financial, procurement and administrative support needed to accomplish the SWPA Mission requirements. Provides operation and maintenance funding required to support the needs of preference customers. The total of $17,316 includes a prior year deferral of $2,325 to fund operations and maintenance requirements. non-Federal ($200)
	$ 9,551	$ 16,737	$ 14,991
Operations and Maintenance	$ 9,551	$ 16,737	$ 14,991

1400

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OPERATION & MAINTENANCE, SOUTHWESTERN POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

SOUTHWESTERN POWER ADMINISTRATION

I. Preface: Purchase Power and Wheeling

This activity provides for the funding of estimated amounts of energy purchases necessary to meet the Government's commitments under sales contracts with its utility customers. The hydro energy marketed by SWPA must be supplemented by energy purchases when low water conditions occur to ensure a useable and reliable power source. SWPA also has other contractual arrangements to deliver power and energy to customers not directly connected to its transmission system and to pay resulting transmission and wheeling expenses.

The Purchase Power and Wheeling reimbursable activity will continue to provide contracted services for energy deliveries to SWPA customers, both military and municipal, served through the transmission facilities of Oklahoma investor-owned utilities. Such reimbursable activity using other Federal funds will eliminate the duplication of appropriation requests with SWPA's military customers, and reduce the appropriations for the pass through billings for the municipal customers by utilizing non-Federal funds.

Program objectives are: (1) Maintain low energy commitments under power sales contracts; (2) Utilize extensive energy banking arrangements to minimize direct purchases of energy; (3) Retain reimbursable authority in two areas, military customers and Oklahoma municipal customers, to maintain lower purchase power and wheeling funding requests; (4) Continue to reduce the need for reimbursable authority by modifying contractual arrangements, where possible, to require Oklahoma municipal and military customers to compensate investor-owned utilities directly for energy deliveries; and (5) Request authority to utilize the continuing fund to cover necessary purchase power and wheeling expenses when hydro generation is below normal.

II. A. Summary Table: Purchase Power and Wheeling

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
System Support Requirements	$ 5,057	$ 4,176	$ 4,983	+ 20
Other Contractual Requirements	9,720	9,967	7,105	- 29
Reimbursable Authority	-6,841	-7,123	-4,199	+ 41
Use of Deferred Funds	-7,936	-5,136	-7,073	- 38
Total, Purchase Power and Wheeling	$ 0	$ 1,884	$ 826	- 56

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Purchase Power and Wheeling			
System Support Requirements	Non-discretionary energy purchases are necessary to supplement hydro generation to meet system contractual obligations for average water conditions. A deferral of $5,057 was used to fund total system support requirements.	Non-discretionary energy purchases are necessary to supplement hydro generation to meet system contractual obligations for average water conditions. A deferral of $2,282 is used to fund total system support requirements.	Non-discretionary energy purchases are necessary to supplement hydro generation to meet system contractual obligations for average water conditions.
	$ 5,057	$ 4,176	$ 4,993
Other Contractual Requirements	Contractual arrangements with other suppliers to deliver power and energy to customers not directly connected to SWPA's transmission system and to pay wheeling expenses. Some amounts reflect contract conversion. A total of $2,879 deferral, was used to fund other contract requirements. These are funds appropriated in three Government Agencies: Ft. Sill, Vance Air Force Base, and McAlester Army Ammunition Plant for energy sold to them which we had to purchase. DOD-Federal ($4,411) These funds would come from various Oklahoma municipal customers. SWPA's request for ability to utilize extensive banking arrangements to minimize direct purchase of energy. non-Federal ($2,430)	Contractual arrangements with other suppliers to deliver power and energy to customers not directly connected to SWPA's transmission system and to pay wheeling expenses. Some amounts reflect contract conversion. A total of $2,844 deferral, is used to fund other contract requirements. These are funds appropriated in three Government Agencies: Ft. Sill, Vance Air Force Base, and McAlester Army Ammunition Plant for energy sold to them which we had to purchase. DOD-Federal ($4,583) These funds would come from various Oklahoma municipal customers. SWPA's request for ability to utilize extensive banking arrangements to minimize direct purchase of energy. non-Federal ($2,540)	Contractual arrangements with other suppliers to deliver power and energy to customers not directly connected to SWPA's transmission system and to pay wheeling expenses. Decreasing amounts reflect conversion of contracts to provide for direct payment to suppliers. These contractual arrangements include costs for purchased energy sold to two Government Agencies, Ft. Sill and McAlester Army Ammunition Plant for which both we and the two agencies had to request appropriations. Reimbursable authority has been requested to eliminate duplicate appropriations. DOD-Federal ($4,136) These contractual arrangements also include costs for purchased energy sold to an Oklahoma municipal customer for which we request appropriations and for which the customer directly reimburses us. Reimbursable authority has been requested to eliminate the need for appropriations. Decreasing amounts reflect conversion of contracts to provide for direct payment to suppliers.

III. Purchase Power and Wheeling (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Other Contractual Requirements (Cont'd)			non-Federal ($83) Provides Purchase Power & Wheeling funding required under contractual arrangements with preference customers. The total of $7,105 includes a prior year deferral of $7,073 to fund Purchase Power & Wheeling requirements.
	$ 9,720	$ 9,967	$ 7,105
Reimbursable Authority	-$ 6,841	-$ 7,123	-$ 4,190
Use of Deferred Funds	-$ 7,836	-$ 5,136	-$ 7,073
Purchase Power and Wheeling	$ 0	$ 1,884	$ 826

26-657 O—90——45

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OPERATION & MAINTENANCE, SOUTHWESTERN POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

SOUTHWESTERN POWER ADMINISTRATION

I. Preface: Construction

The goals of SWPA's construction activities are to maintain and enhance power transmission system safety and reliability, thereby insuring continued safe, reliable delivery of power to our preference customers; to encourage new initiatives for more effective use of existing regional generation resources; and to accommodate development of new non-Federally funded hydroelectric generation resources.

To achieve the goal of maintaining and enhancing power transmission system safety and reliability, SWPA will continue its ongoing program of transmission system facilities replacement and modernization. SWPA's power transmission is a mature system with much of the equipment now being 35 to 40 years old. As system loads grow and the reliability requirements of SWPA's system increase, SWPA will continue to be responsive to increasing equipment replacement and modernization requirements. Emphasis will be placed upon replacement of critical items of equipment which have a high risk of failure or which require excessive maintenance due to age and deterioration. This program will reduce unplanned outages, lower maintenance costs, and improve operation efficiency.

For more effective use of generation and transmission resources and to facilitate economies of one utility operation, SWPA will continue to prepare long-range joint regional planning and feasibility studies focusing upon identifying beneficial joint participation or totally non-Federally funded construction projects. These studies will emphasize obtaining maximum benefits to the consumers of the region through taking advantage of existing SWPA facility sites and rights-of-way; through achieving economies of scale by developing one large project in lieu of two or more smaller projects; and through enhancement of revenues from the SWPA power transmission system.

SWPA has developed methods of using non-Federal funds to accomplish needed transmission system repairs, modifications, or additions. This initiative reduces SWPA's need for new appropriations, while allowing SWPA to encourage initiatives to enhance regional transmission system capacity, to promote development of non-Federally funded hydroelectric generating resources and to respond to emergency requests for assistance from customers. Such construction is developed under SWPA's "one utility concept" which provides for planning and construction improvements on a joint basis with other area utilities as if we were all one utility, thus contributing to a more efficient overall system operation. Such work is necessary on SWPA's system equipment and premises to adjust to continually changing utility demands and must be managed by SWPA because of reliability issues.

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II. A. Summary Table: Construction

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Transmission System Replacements	$ 5,079	$ 5,711	$ 2,072	- 64
Transmission System Improvements	617	1,000	12,290	>999
Capital Equipment Not Related to Construction	142	925	329	- 65
Power Pooling Arrangements	0	1,000	0	-100
One Time Construction Projects/Engineering Studies & Designed Activities	1,000	5,100	0	-100
Reimbursable Authority	-1,000	-4,500	-4,500	0
Use of Deferred Funds	0	-2,800	-5,882	-110
Total, Construction	$ 5,838	$ 6,436	$ 4,290	- 33

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Construction			
Transmission System Replacements	Replacement of deteriorated communications and control equipment. Additions to existing communications equipment needed for operational responsibilities arising from being a member of an interconnected power pool. Replacement of deteriorated, underrated, worn-out, or damaged substation equipment. Also additional interconnection. $ 5,079	Replacement of deteriorated, worn-out, obsolete, or damaged transmission system equipment and for modifications or additions to previously installed facilities to accommodate requirements of inter- connected system operations. Respond to customer emergencies. Includes engineering studies, design activities, and construction activities for various transmission systems and modifications to previously completed facilities. The obligation authority of $5,311 reflects $4,511 in new BA and $800 in prior year balances from a deferral. non-Federal ($400) $ 5,711	Replacement of deteriorated, worn-out, obsolete, or damaged transmission system equipment to maintain and enhance power transmission system safety and reliability. Includes engineering design, installation, and construction activities for power system protective relay replacements, power circuit breaker replacements, and communication equipment replacements. $ 2,072

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III. Construction (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Transmission System Improvements	Replacement of deteriorated transmission line equipment. Modification needed to meet increasing load demands. Interconnections with adjacent utility systems.	Replacement of existing components of SWPA's transmission system with new components with larger capacities in order to improve the system's overall performance as SWPA moves to the mid-1990's ultimate high system loading.	Replacement of existing components of SWPA's transmission system with new components with larger capacities in order to improve the system's overall performance and reliability as SWPA moves to the mid-1990's ultimate high system loading. Modifications and additions to previously installed facilities to accommodate requirements of new power sales contracts and variable requirements of interconnected system operations. Transmission system additions identified by joint regional planning efforts which allow more effective use of generation and transmission resources. Includes transmission system replacements, modifications, and additions identified through joint regional planning as beneficial joint participation or totally non-federally funded projects. Includes engineering feasibility studies, environmental studies, and design installation, and construction activities relating to upgrade of equipment to increase transmission capacity and reliability, communications expansions and additions, bus modification and, bay additions at existing substations, substations modifications and additions to accommodate customer interconnections, and additional transmission lines and substations to allow more efficient overall system operation. The obligated authority of $12,290 is offset by $5,882 in prior year balances from a deferral. These non-Federal funds reduce SWPA's need for new appropriations. non-Federal ($4,500)

III. Construction (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Transmission System Improvements (Cont'd)	$ 617	$ 1,000	$ 12,290
Capital Equipment Not Related to Construction	Replacement of vehicles, tractors, trailers, heavy equipment, and repair parts.	Replacement of vehicles, tractors, trailers, and heavy equipment used for maintenance and repair of transmission system equipment and facilities. Replacements are scheduled based upon DOE and GSA usage and replacement guidelines. ADP equipment replacement of two new management information systems will be implemented. Both require substantial central processor resources. The PRIME central processor will be upgraded to provide this processing capability.	Replace of vehicles, tractors, trailers, and heavy equipment used for maintenance and repair of transmission system equipment and facilities. Replacements are scheduled based upon DOE and GSA usage and replacement guidelines.
	$ 142	$ 925	$ 320
Power Pooling Arrangements	No activities.	The addition of new communications and control equipment required to allow integration of customer thermal generation resources with SWPA's hydroelectric generating resources. The estimated construction cost of all necessary facilities is $1,800 of which $1,100 would be obtained from non-Federal interests. Construction would begin in FY 1990 and continue through FY 1992. The obligation authority of $460 is offset by $400 in prior year balances from a deferral. non-Federal ($600)	No activities are planned for this program due to revised regional planning schedules.
	$ 0	$ 1,000	$ 0

III. Construction (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
One Time Construction Projects/Engineering Studies & Designed Activities	The funds will come from various customers for the SEMO-BEARK transmission and substation additions, modifications of transmission lines, substations, and electronic facilities. Federal ($0) non-Federal ($300) These funds are for the W.D. Mayo Dam project, for the construction of transmission facilities under Public Law 99-662. Federal ($0) non-Federal ($700)	Initiate and complete the DC interconnection engineering studies and provide engineering feasibility and design studies relating to construction of a High Voltage Direct Current interconnection between the interconnected systems of the Southwest Power Pool and the interconnected systems of the Electric Reliability Council of Texas. The interconnection would be constructed at the Corps Denison Dam. The estimated total construction cost of all necessary facilities is $40,000 of which $20,000 would be obtained from non-federal interests. Construction would begin in FY 1991 and be complete in FY 1994. The obligation authority of $500 is offset by $500 in prior year balances from a deferral. non-Federal ($500) SCADA-AGC engineering studies provides for engineering feasibility and design studies relating to the replacement of SWPA's existing Supervisory Control and Data Acquisition (SCADA) system and Automatic Generation Control (AGC) equipment. The obligation authority of $400 is offset by $400 in prior year balances from a deferral. Central Arkansas Interconnection Engineering Studies provides for engineering feasibility, environmental, and design studies relating to construction of additional transmission line and terminal facilities for the Central Arkansas Interconnection Project. That project involves potential future construction of approximately 113 miles of 161-kV transmission lines and associated	Due to revised joint regional planning schedules, all activities for this program have been reduced and consolidated under Transmission System Improvements. Preliminary studies related to the DC interconnection were completed by SWPA in FY 1988 and will be completed by the COE in FY 1990. Regional utility interest in this DC interconnection is minimum at this time. SWPA will continue to facilitate this project in FY 90 at various customer forums. Additionally, SWPA will continue to perform detailed studies and designs for this project as required by the COE and/or as directed by Congress. SCADA-AGC engineering studies have indicated the need to replace the existing outdated system. At the target level, SWPA will replace this system in stages over a number of years, resulting in increased reliability concerns and the possibility of extended power system outages. Central Arkansas Interconnection Engineering Studies provides for engineering feasibility, environmental, and design studies relating to construction of additional transmission line and terminal facilities for the Central Arkansas Interconnection Project. That project involves potential future construction of approximately 113 miles of 161-kV transmission lines and associated substations to interconnect the existing Dardanelle Lock and Dam and Greers Ferry Lake Federal hydroelectric

III. Construction (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
One Time Construction Projects/Engineering Studies & Designed Activities (Cont'd)		substations to interconnect the existing Dardanelle Lock and Dam and Greers Ferry Lake Federal hydroelectric power facilities with a proposed Federal hydroelectric facility at Toad Suck Ferry Lock and Dam and a non-Federal hydroelectric facilitiy being developed by the city of North Little Rock, Arkansas. The estimated total construction cost of the potential project is $45,000 of which $31,500 would be obtained from non-Federal interests. Construction would begin in FY 1991 and be complete in FY 1994. The obligation authority of $600 is offset by $600 in prior year balances from a deferral. non-Federal ($1,400) Oklahoma-Arkansas transmission additions provides for the continuation of the engineering feasibility studies relating to the construction of additional transmission line and terminal facilities linking Federal hydroelectric power facilities in Oklahoma to those in Arkansas. The obligation authority of $100 is offset by $100 in prior year balances from a deferral. non-Federal ($400) Construction of the Southeast Missouri Energy Center (SEMEC) inlcudes the construction of a 161-kV transmission line terminal at SWPA's Sikeston substation to accommodate a transmission line interconnection with the Scott County Port Authority transmission system in exchange for 20,000 kW of capacity in the Authority transmission system. The construction would be completed in FY 1990. non-Federal ($1,200)	facility at Toad Suck Ferry Lock and Dam and a non-Federal hydroelectric facility being developed by the city of North Little Rock, Arkansas. Actual construction progress on this initiative has been delayed due to revised regional planning schedules. SWPA will continue to perform studies in FY 1990 and facilitate non-Federal participation in this initiative. Oklahoma-Arkansas transmission additions provides for the continuation of the engineering feasibility studies relating to the construction of additional transmission line and terminal facilities linking Federal hydroelectric power facilities in Oklahoma to those in Arkansas. Actual construction progress on this initiative has been delayed due to revised regional planning schedules. SWPA will continue to perform studies in FY 1990 and facilitate non-Federal participation in this initiative.

III. Construction (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
One Time Construction Projects/Engineering Studies & Designed Activities (Cont'd)	$ 1,000	$ 5,100	$ 0
Reimbursable Authority	-$ 1,000	-$ 4,500	-$ 4,500
Use of Deferred Funds	$ 0	-$ 2,800	-$ 5,882
Construction	$ 5,838	$ 8,436	$ 4,290
Total Southwestern Power Administration	$36,430	$45,180	$44,296

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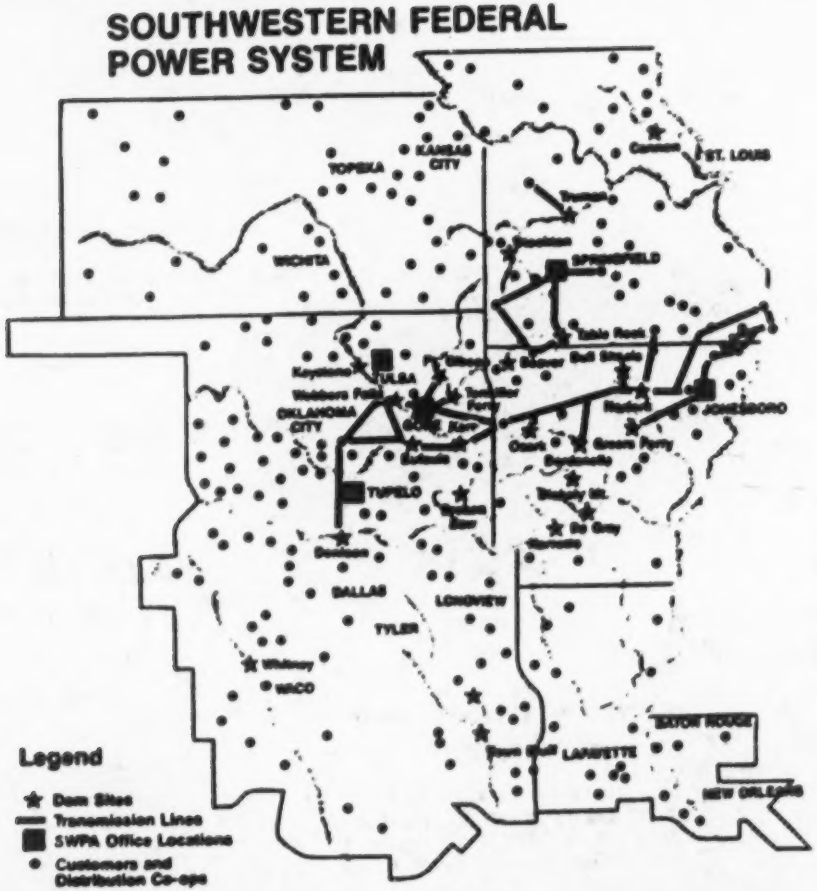
SOUTHWESTERN FEDERAL
POWER SYSTEM
TOPEKA
KANSAS CITY
ST. LOUIS
WICHITA
SPRINGFIELD
TULSA
OKLAHOMA CITY
JONESBORO
TUPELO
DALLAS
LONGVIEW
TYLER
WACO
BATON ROUGE
LAFAYETTE
NEW ORLEANS
Legend
Dam Sites
Transmission Lines
SWPA Office Locations
Customers and Distribution Co-ops

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

SYSTEM STATISTICS

SOUTHWESTERN POWER ADMINISTRATION

	1989 Actual	1990 Estimate	1991 Estimate
Generating Capacity:			
Installed Capacity (kW)	2,150,400	2,158,000	2,158,000
Peak Capacity (kW)	2,041,000	2,092,800	2,092,800
Generating Stations:			
Generating Projects (No.)	24	24	24
Substations/Switchyards (No.)	24	24	24
Substations/Switchyards (KVA Capacity)	929,400	1,026,900	1,026,900
Available Energy:			
Energy Generated (MWh)	5,886,779	5,028,000	5,028,000
Energy Purchased (MWh)	125,985	434,300	434,400
Energy Available for Marketing (MWh)	5,643,444	5,272,100	5,272,100
Transmission Lines (Circuit Miles):			
161-KV	1,117	1,117	1,117
138-KV	164	164	164
69-KV	99	99	99
Total Circuit Miles	1,380	1,380	1,380

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
POWER MARKETED, WHEELED OR EXCHANGED BY PROJECT

SOUTHWESTERN POWER ADMINISTRATION

Project Power Marketed	State	No. of Plants	Installed Capacity (kW)	FY 1989 Actual Energy (GWH)	FY 1990 Estimated Energy (GWH)	FY 1991 Estimated Energy (Gwh)
(Interconnected (System)	Missouri	4	463,200	1,863	2,070	2,070
	Arkansas	9	1,021,100	1,078	708	708
	Oklahoma	7	514,100	1,080	1,066	1,066
	Texas	2	100,000	608	636	636
	Louisiana			423	344	344
	Kansas	—	—	389	294	294
Subtotals		22	2,098,400	5,441	5,118	5,118
Isolated						
Robert D. Willis Project 1/ Sam Rayburn Project	Texas	2	59,600	63	78	78
(50% to TX; 50% to LA)	Louisiana	—	—	63	77	77
Subtotal		2	59,600	126	155	155
Total, Power Marketed		24	2,158,000	5,567	5,273	5,273
Power Wheeled and Exchanged						
Wheeled (MW)				367	361	378
Exchanged (GWh)				204	58	78

1/ Formerly Town Bluff Project, on-line-date, December 1, 1989

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY

REVENUE AND RECEIPT REPORT
(dollars in thousands)

	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995
Southwestern Power Administration							
Gross Revenues	$88,826	$88,375	$ 89,538	$ 89,873	$ 90,154	$ 95,031	$ 95,257
Receipts:							
Sale and transmission of electric energy	86,826	86,375	87,538	87,873	88,154	95,031	93,257
Net billing amt. credited back to Appro. as an offsetting receipt	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Percent of sales to preference customers	100%	100%	100%	100%	100%	100%	100%
Energy Sales from Power Marketed (billions of kilowatt hours)	5.3	5.3	5.3	5.3	5.3	5.3	5.3

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
SOUTHWESTERN POWER ADMINISTRATION
(Obligations in thousands of dollars)

OBJECT CLASS SUMMARY

Southwestern Power Administration

Direct Funding:		FY 1989	FY 1990	FY 1991
11.1	Full-time permanent	$6,041	$6,583	$6,572
11.3	Other than full-time permanent	326	755	324
11.5	Other personnel compensation	357	393	353
11.8	Special personal services payments	76	0	10
11.9	Total personnel compensation	6,800	7,731	7,259
12.1	Civilian personnel benefits	930	1,307	1,568
21.0	Travel and transportation of persons	1,079	1,114	1,144
22.0	Transportation of things	139	123	207
23.1	Rental payments to GSA	399	476	736
23.2	Rental payments to others	726	722	694
24.0	Printing and reproduction	150	127	131
25.0	Other services	16,312	19,032	21,553
26.0	Supplies and materials	1,055	1,158	1,039
31.0	Equipment	995	1,658	1,055
32.0	Land & structures	3	8	8
42.0	Insurance claims & indemnities	1	1	1
43.0	Interest and dividends	0	0	2
Subtotals		28,589	33,457	35,397
	Reimbursable Obligations	7,841	11,723	8,899
Totals		$36,430	$45,180	$44,296

VOLUME 4

WESTERN AREA POWER ADMINISTRATION

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE

PROPOSED APPROPRIATION LANGUAGE
(INCLUDING TRANSFER OF FUNDS)

For carrying out the functions authorized by title III, section 302(a)(1)(E) of the Act of August 4, 1977 (Public Law 95-91), and other related activities including conservation and renewable resources programs as authorized, including official reception and representation expenses in an amount not to exceed $1,500, [the purchase, maintenance, and operation of one helicopter for replacement only, $291,233,000][1/] $293,762,000, to remain available until expended, of which [$264,457,000] $266,101,000, shall be derived from the Department of the Interior Reclamation fund; in addition, the Secretary of the Treasury is authorized to transfer from the Colorado River Dam Fund to the Western Area Power Administration [$3,564,000] $4,702,000, to carry out the power marketing and transmission activities of the Boulder Canyon project as provided in section 104(a)(4) of the Hoover Power Plant Act of 1984, to remain available until expended[: Provided, That, the continuing fund established in Public Law 98-50 shall also be available on an ongoing basis for paying for purchase power and wheeling expenses when the Administrator determines that such expenditures are necessary to meet contractual obligations for the sale and delivery of power during periods of below-normal hydropower generation. Payments from the continuing fund shall be limited to the amount required to replace the generation deficiency, and only for the project where the deficiency occurred. Replenishment of the continuing fund shall occur within twelve months of the month in which the funds were first expended][1/]. (Energy and Water Development Appropriations Act, 1990.)

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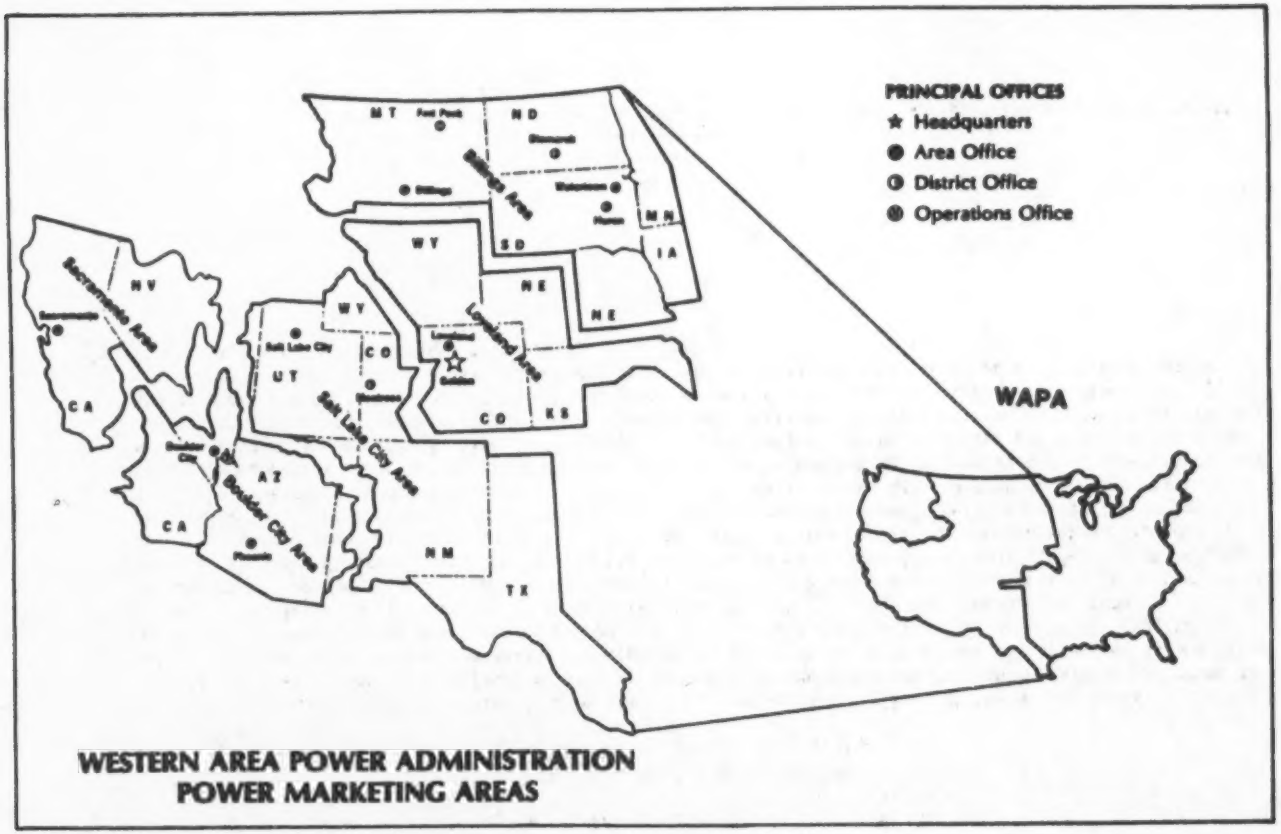
Explanation of Change

1/ Deletes language contained in the FY 1990 Energy and Water Development Appropriations Act which is not required in the appropriation act for fiscal year 1991.



WESTERN AREA POWER ADMINISTRATION
POWER MARKETING AREAS

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION

OVERVIEW

Western's first priority is to market power produced at Federal dams at rates that (1) repay operation, maintenance, purchase power, and wheeling expenses; (2) ensure repayment of the Federal power investment with interest; and (3) assist in the repayment of irrigation investment that is beyond the repayment ability of the irrigators. Western also markets its power resources in coordination with regional utilities to hold down costs to the consumer.

Western develops power marketing plans to allocate limited hydropower resources among our customers. Recently developed plans financially and contractually integrate multiple projects. Consolidation of projects for ratemaking purposes promotes economy by saving the time and expense associated with individual project rate adjustments and allows for more efficient delivery of power.

Once power marketing plans are adopted, Western enters into contracts with our customers to implement the plan. These contracts not only cover firm power sales but extend to transmission service, interconnections, operation, maintenance, emergency services, short-term power sales, and conservation and renewable energy plans. Contract initiatives include joint participation arrangements with regional utilities for construction of mutually advantageous facilities. Western also enters into contracts for non-Federal financing of authorized facilities, with a goal of reducing the need for Federal appropriations.

Western's program is divided into three activities: (1) Construction and Rehabilitation, (2) Operation and Maintenance, and (3) Purchase Power and Wheeling. An overview of each activity is described on the following pages.

CONSTRUCTION AND REHABILITATION

Federal hydropower generation represents a significant economic resource, but transmission limitations within Western's marketing area adversely affect the ability of some potential customers to take full advantage of this resource through firm power deliveries and short-term power sales, purchases, and exchanges. Western conducts a transmission system construction and rehabilitation program to assure the ability to market power in accordance with Western's objective of encouraging widespread use of Federal hydroelectric power. Western's construction activity will improve opportunities for economic purchases of capacity or energy during drought conditions, emergencies, and other occasions when appropriate. Construction is undertaken when studies prove the complementary need for power exchanges among projects and regions. Upgrades and rehabilitation of existing facilities are pursued to provide adequate system reliability, reduce outages, lower maintenance costs, reduce transmission losses, and improve overall system operating efficiency.

As part of an interconnected utility system, Western must be prepared to make system changes required by changing conditions and system reliability requirements. Because of its large transmission system, Western is often a leader in coordinating planning among affected parties to identify the most effective transmission system improvements. In response to the need for Federal budget restraint and efficiency and to assure environmental sensitivity, Western works with other utilities to formulate joint plans for needed construction projects in a manner which will reduce or eliminate the requirement for Federal appropriations. Western will continue to be an important partner in the development of innovative initiatives for the construction of required facilities.

OPERATION AND MAINTENANCE

Western's transmission system is a vital element of the Nation's electricity grid. It must be operated and maintained at established industry standards while accommodating system changes and increased demand. Older facilities are replaced on a schedule that is coordinated with the utilities that depend on Western for their bulk energy supply as well as those with whom Western interconnects. The cost of Western's work is often shared with other Federal entities under reimbursable agreements and with non-Federal participants under the Contributed Funds Act.

System reliability requires an effective operation and maintenance program, including inspection and maintenance of transmission lines, substations, other system facilities and equipment. Ongoing power system studies of current and projected operational demands identify the need for improvements or efficiencies as well as identifying opportunities for use of state of the art or emerging technologies in the interconnected transmission system.

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Western also plans for systematic replacement and upgrades of equipment. These activities ensure system reliability, integrity, and efficiency by using the latest state-of-the-art equipment and technology. Other activities include a conservation and renewable energy program that concentrates on wise and efficient use of energy resources and a security and emergency coordination program which focuses on system reliability through ongoing vulnerability assessments, emergency planning, and simulated exercises. Western's commitment to a clean, environmentally safe future is an integral part of the operation and maintenance program.

PURCHASE POWER AND WHEELING

Western purchases power to supplement Federal hydropower supplies, primarily for the Central Valley Project in California. Both energy and capacity are purchased to assure firm power deliveries that are not subject to curtailment in the event of unanticipated events such as a drought. In addition, wheeling services are acquired whenever a third party's transmission lines are needed to deliver Federal power to Western's customers. In order to minimize the need for appropriations, alternative financing arrangements (such as net billing, bill crediting, reimbursable authority, and non-appropriation transfers) are used to fund a large portion of the purchase power and wheeling program activity. Receipts deposited in the Treasury are reduced by the amount of alternative financing.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
(dollars in thousands)

LEAD TABLE

CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE

Activity	FY 1989	FY 1990 Estimate	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
Construction and Rehabilitation.....	$ 92,899	$ 97,117	$ 97,477	$110,520	$+13,043	+13%
Operation and Maintenance 1/.....	92,050	107,846	108,905	115,509	+6,604	+6%
(Permanent Budget Authority)	(2,213)	(3,738)	(3,738)	(3,262)	(-476)	(-13%)
Purchase Power and Wheeling 1/	87,713	100,223	100,223	100,000 6/	-223	0%
(Permanent Budget Authority)	(642)	(1,600)	(1,600)	(1,440)	(-160)	(-10%)
Total Program	$272,662	$305,186	$306,605	$326,029	$+19,424	+6%
Use of Unobligated Balances (net)	-1,517 2/	-10,968 4/	-10,968	-27,565	-16,597	-
Total Budget Authority 1/	$271,145 3/	$294,218 5/	$295,637	$298,464	$+ 2,827	+1%
Staffing (FTEs)	1,163	1,143	1,143	1,060		

NOTE: 1/ Includes permanent budget authority for operation, maintenance, and purchase power activities for the Boulder Canyon Project, as provided in section 104(a)(4) of the Hoover Power Plant Act of 1984.

2/ This is the sum of the $35,938,108 of unobligated carryover available at the beginning of FY 1989 plus the $4,112,155 of FY 1989 deobligations of prior year obligations, less the $38,532,923 unobligated at the end of FY 1989.

3/ Reflects transfer of $2,267,817 to the Energy Supply R&D appropriation from $273,413,000 appropriated for this account.

4/ This is the difference between the $38,532,923 unobligated balance at the beginning of FY 1990 and the $27,565,000 planned unobligated balance at the end of FY 1990.

5/ Reflects sequestration of $579,000 out of the FY 1990 appropriation of $294,797,000.

6/ Includes planned unobligated balances of $27,565,000.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
(dollars in thousands)

SUMMARY OF CHANGES

CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE

FY 1990 Appropriation	$294,218
Adjustments - Pay cost	+1,800
- Rental payments for space	-381
Use of unobligated balances (net)	+10,968
FY 1991 Base	$306,605
Construction and Rehabilitation	
- Additional power system capacity and increased system reliability and operational efficiency	+13,043
Operation and Maintenance (O&M)	
- Increased cost of supplies, material, services, and equipment for maintenance of substations, transmission lines, and communication systems at industry standards. Extraordinary maintenance costs for assessment, removal, and cleanup of pollutants; wood pole treatment; and erosion control at substations and along access roads	+3,117
- Replacement of equipment which was delayed from FY 1989 and FY 1990 because a change in Western's indirect cost distribution system caused the operation and maintenance activity to absorb a larger portion of Western's indirect costs	+3,487

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
(dollars in thousands)

SUMMARY OF CHANGES (Continued)

CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE

Purchase Power and Wheeling	
- Essentially no change in purchase power and wheeling program funding	-223
FY 1991 Congressional Budget Request, including use of planned unobligated balances	$326,029

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DEPARTMENT OF ENERGY
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WESTERN AREA POWER ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE

I. Preface: Construction and Rehabilitation

Western plans, designs, and constructs facilities to enhance power system reliability and stability and to ensure the delivery of power to customer delivery points. Western's construction activity primarily involves upgrading, rehabilitating, and extending the existing power system to reduce outages, reduce maintenance costs, and improve overall operational efficiency. Construction work also provides increased joint transmission capacity to transfer energy from renewable resources. As conditions change and the reliability requirements of Western's interconnected power system increase, Western will continue to be responsive to customers by facilitating system changes which are necessary for the reliable operation of the power transmission system. As an important part of this effort, Western will continue its leadership in planning for and in constructing transmission facilities to efficiently use available generation to meet power delivery obligations.

To the maximum extent possible, Western works with neighboring utilities to engage in jointly financed construction activities. By participating with other utilities on joint projects, Western is able to take advantage of existing facility sites and transmission line rights-of-way, achieve economy of scale by developing one large project in lieu of two or more smaller projects, improve environmental planning, enhance revenues from the Federal power system, and reduce Federal appropriations.

There are three subactivities listed which describe Western's construction and rehabilitation activity: (1) Transmission Lines and Terminal Facilities; (2) Substations; and (3) Other, e.g., improvements at Western's maintenance centers. The subactivities further describe, by fiscal year, work which is beginning, continuing, and completing in accordance with staged plans for the orderly and efficient construction of power facilities.

II. A. Summary Table

Program Activity	FY 1989	FY 1990 Estimate	FY 1991 Request	FY 1991 $ Change
Transmission Lines and Terminal Facilities	$ 72,539	$ 80,675	$ 90,139	+11
Substations	8,954	24,748	33,866	+37
Other Facilities	10,491	18,093	20,515	+13
Subtotal, Construction and Rehabilitation Budget Authority	$ 91,984 1/	$ 93,517	$110,520	+18
Use of Unobligated Balances	+915	+3,600	-0-	-
Total, Construction and Rehabilitation	$ 92,899	$ 97,117	$110,520	+14

1/ Reflects transfer of $2,267,017 to the Energy Supply R&D appropriation from the $94,252,000 appropriated for this activity.

III. Construction and Rehabilitation Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
Transmission Lines and Terminal Facilities	Work was completed on the Conrad-Shelby No. 2 230-kV Transmission Line. ($416)	No activity. ($0)	No activity. ($0)

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III. Construction and Rehabilitation

Program Activity	FY 1989	FY 1990	FY 1991
Transmission Lines and Terminal Facilities (continued)	Work continued on the Glen Canyon-Flagstaff-Pinnacle Peak transmission system. ($2,271)	Work continued on the Glen Canyon-Flagstaff-Pinnacle Peak transmission system. ($2,562)	Work will be completed on the Glen Canyon-Flagstaff-Pinnacle Peak transmission system. ($1,474)
	Work continued on Phase I of the Western Colorado 345-kV transmission system. Federal ($1,473) Non-Federal (174) Total ($1,647)	Minor work continued on Phase I of the Western Colorado 345-kV transmission system. Federal ($196) Non-Federal (0) Total ($196)	Work will be completed on Phase I of the Western Colorado 345-kV transmission system, including construction of the approach spans into the Shiprock and Four Corners Substations. Federal ($850) Non-Federal (0) Total ($850)
	Construction was completed on the Casper-Glenrock 230-kV Transmission Line and terminal facilities. ($120)	No activity. ($0)	No activity. ($0)
	Construction work completed on the Liberty-Parker No. 2 230-kV Transmission Line. ($725)	Construction work will continue on the terminal facilities for the Liberty-Parker No. 2 230-kV Transmission Line and terminal facilities. ($800)	Work will be completed on the Liberty-Parker No. 2 230-kV transmission line and terminal facilities. ($140)
	Design and right-of-way activities continued for the California-Oregon Transmission Project. Federal ($1,085) Non-Federal (2,946) Total ($4,031)	Award of major construction contracts is anticipated for uprating the Shasta-Tracy line to 500 kV, new substation at Olinda, new series compensation station at Hamwell, and expansion of the existing Tracy Substation. Uncertainties continue to exist with regard to investor-owned utility participation due to their inability to receive necessary certification from the California Public Utilities Commission. Unobligated balances of $3,660,000 are expected to be used for continuing acquisition of right-of-way and material acquisition for relocating existing lines in advance of substation construction. Federal ($ 0) Non-Federal (85,920) Total ($85,920)	Construction work will continue. Federal ($ 0) Non-Federal (105,976) Total ($105,976)
	Construction continued on the 7-mile Buffalo Bill 69-kV Transmission Line and terminal facilities. ($7,430)	Construction will be completed on the Buffalo Bill 69-kV Transmission Line and terminal facilities. ($372)	No activity. ($0)

III. Construction and Rehabilitation

Program Activity	FY 1979	FY 1980	FY 1981
Transmission Lines and Terminal Facilities (continued)	Construction continued on the 12.5-mile Lawrence Livermore-Tracy 230-kV Transmission Line and terminal facilities. ($6,500)	Construction will be completed on the Lawrence Livermore-Tracy 230-kV Transmission Line and terminal facilities. ($2,281)	No activity. ($0)
	Environmental and design work continued on the Tracy-Banks 230-kV Transmission Line in California. ($1,680)	Construction will begin on the Tracy-Banks 230-kV Transmission Line. ($400)	Construction will begin on terminal facilities for the Tracy-Banks 230-kV Transmission Line. ($945)
	Construction continued on the Jamestown-Grand Forks 230-kV Transmission Line and terminal facilities in North Dakota. ($7,300)	Construction will continue on the Jamestown-Grand Forks 230-kV Transmission Line and terminal facilities. ($1,340)	Work will be completed on the Jamestown-Grand Forks 230-kV Transmission Line and terminal facilities. ($264)
	Continue construction of the Boars Ears-Bonanza (formally known as Craig-Bonanza) 345-kV Transmission Line and terminal facilities. Federal ($14,260) Non-Federal (4,850) Total ($19,110)	Complete construction of the Boars Ears-Bonanza 345-kV Transmission Line and terminal facilities. Federal ($1,129) Non-Federal (1,152) Total ($2,281)	No activity. ($0)
	Continue environmental, design, and right-of-way work for the Charlie Creek-Bellfield 345-kV Transmission Line and terminal facilities in North Dakota. ($1,925)	A construction contract will be awarded for the Charlie Creek-Bellfield 345-kV Transmission Line and terminal facilities. ($16,680)	Construction will be completed on the Charlie Creek-Bellfield 345-kV Transmission Line and terminal facilities. ($2,086)
	Work continued on facilities for the Ault-Fort Saint Vrain 230-kV Transmission Line in Colorado. Federal ($ 388) Non-Federal (2,636) Total ($2,924)	Construction activities will be completed on facilities for the Ault-Fort Saint Vrain 230-kV Transmission line. Federal ($ 411) Non-Federal (2,636) Total ($3,047)	No activity. ($0)
	Construction work began in Wyoming on the upgrade of the 63-mile Lovell-North Cody-Big George Transmission Line for 115-kV operation. ($6,544)	Construction will continue on the Lovell-North Cody-Big George 115-kV Transmission Line. ($400)	Construction will be completed on the Lovell-North Cody-Big George 115-kV Transmission Line. ($1,993)
	Environmental and design work were essentially completed for the 18-mile Miracle Mile Transmission Consolidation project (formerly the Seminoe-Kortes Transmission Consolidation project) in Wyoming. ($1,734)	Construction will begin on the Miracle Mile Transmission Consolidation project. ($5,756)	Work will continue primarily for modifications at Seminoe and Kortes Substations. ($483)

III. Construction and Rehabilitation

Program Activity	FY 1989	FY 1990	FY 1991
Transmission Lines and Terminal Facilities (continued)	Design work was completed and equipment acquisition began for Liberty and Phoenix Substations in Arizona. ($1,087) Design work continued on the reconductoring of the Flatiron-Weld 115-kV Transmission Line in Colorado. ($191) Construction was underway on the Granby-Windy Gap 138-kV Transmission Line and terminal facilities upgrade in Colorado. Federal ($3,400) Non-Federal (243) Total ($3,643) Design work began on the Limestone-Goring-Bayard-McGraw 34.5/69-kV Transmission Line and terminal facilities in Nebraska and Wyoming. ($428) Design work began on the reconductoring of the Cottonwood-Elverta No. 3 230-kV Transmission Line in California. ($500) Work was underway for transmission facilities to the Dolores Project in Colorado. The cost of this work will be reimbursed by the Bureau of Reclamation. Federal BOR ($ 0) Federal Non-BOR (2,825) Total ($ 2,825) Design work began for the New Waddell-Westwing 230-kV Transmission Line in Arizona. The cost of this work will be reimbursed by the Bureau of Reclamation. Federal BOR ($ 0) Federal Non-BOR (78) Total ($ 78)	A contract will be awarded for the 2-mile Liberty-Phoenix 230-kV Transmission Line modification. ($6,083) Construction will begin on reconductoring 25 miles of the Flatiron-Weld 115-kV Transmission Line. ($706) Construction will continue on the Granby-Windy Gap 138-kV Transmission Line and terminal facilities upgrade. Federal ($212) Non-Federal (62) Total ($274) A contract will be awarded for rehabilitating the first 23-mile Goring-Bayard 34.5-kV Transmission Line section. ($1,974) Design work will continue on reconductoring the Cottonwood-Elverta No. 3 230-kV Transmission Line. ($75) Construction will continue on the Dolores Project. Federal BOR ($ 0) Federal Non-BOR (1,862) Total ($ 1,862) Award of contract for 11 miles of the New Waddell-Westwing 230-kV Transmission Line. Federal BOR ($ 0) Federal Non-BOR (2,372) Total ($2,372)	Work will be substantially complete for the Liberty-Phoenix 230-kV Transmission Line modifications. ($1,631) Work will be completed on the Flatiron-Weld 115-kV Transmission Line. ($183) Minor work will be completed on the Granby-Windy Gap 138-kV Transmission Line and terminal facilities. Federal ($170) Non-Federal (170) Total ($340) Work will continue on the Limestone-Goring-Bayard-McGraw 34.5/69-kV Transmission Line and terminal facilities. ($800) Construction will begin on reconductoring the 60-mile Cottonwood-Elverta No. 3 230-kV Transmission Line. ($6,240) Construction of facilities to serve the Dolores Project will continue, including work at the Bone Creek Pumping Plant Substation and the Towaoc Canal Powerplant Tap. Federal BOR ($ 0) Federal Non-BOR (977) Total ($977) Complete construction of the New Waddell-Westwing 230-kV Transmission Line. Federal BOR ($ 0) Federal Non-BOR (1,045) Total ($ 1,045)

III. Construction and Rehabilitation

Program Activity	FY 1989	FY 1990	FY 1991
Transmission Lines and Terminal Facilities (Continued)	Construction work continued under reimbursable agreements with the Bureau of Reclamation to construct transmission facilities to serve the Central Arizona Project. Federal-OOE ($ 0) Other Federal (3,906) Total ($3,906)	Work continues on Central Arizona Project facilities. Federal-OOE ($ 0) Other Federal (7,566) Total ($7,566)	Construction will be complete for transmission facilities that serve the Central Arizona Project. Federal-OOE ($ 0) Other Federal (2,824) Total ($2,824)
	Planning and design work began for Casper, Wyoming, Area transmission line modifications. ($30)	Design work will continue for Casper Area transmission line modifications. ($25)	Construction work will be underway to remove and reroute transmission lines in order to eliminate redundant, obsolete, and encroached facilities and to fulfill environmental commitments. ($189)
	Planning and environmental activities were underway for the proposed 80-mile Sidney-North Yuma 230-kV Transmission Line in Nebraska and Colorado. Western will participate with the Public Service Company of Colorado and the Tri-State Generation and Transmission Association, Inc. (Tri-State). Federal ($1,078) Non-Federal (0) Total ($1,078)	Engineering work will proceed for the Sidney-North Yuma 230-kV Transmission Line. The line will provide capability to import energy to serve Western's loads in eastern Colorado and will also help support the full capacity of the Sidney AC-DC-AC tie. Federal ($1,981) Non-Federal (0) Total ($1,981)	Construction will begin on the Sidney-North Yuma 230-kV Transmission Line. Western's share is 55 percent of the total project cost of about $14.3 million. Tri-State is the project and construction manager. Federal ($5,870) Non-Federal (4,148) Total ($10,218)
	Engineering studies began for the 14-mile Roseville-Elverta No. 2 230-kV Transmission Line in California. The work will be jointly financed with the City of Roseville. Federal ($ 0) Non-Federal (835) Total ($ 835)	Engineering work will be completed for the Roseville-Elverta No. 2 230-kV Transmission Line. Work will consist of construction of 14 miles of double circuit towers. Western's circuit will be used to loop the existing Cottonwood-Elverta No. 3 230-kV line into the Roseville Substation to provide contingency in case of power outages. Roseville's circuit will provide for future load growth. Federal ($ 0) Non-Federal (1,740) Total ($1,740)	Construction will continue on the Roseville-Elverta No. 2 230-kV Transmission Line. Federal ($1,529) Non-Federal (2,737) Total ($4,267)

III. Construction and Rehabilitation

Program Activity	FY 1989	FY 1990	FY 1991
Transmission Lines and Terminal Facilities (cont'd)	Planning work with non-federal participants began on the Kansas transmission project. Lack of transmission access currently hinders customers purchasing low-cost energy from Western. ($10)	Engineering studies and power marketing negotiations will continue for the construction of new transmission facilities and substation improvements in southwest Kansas. Western's participation in the Kansas transmission project will make capacity available to serve customers. Cost-sharing arrangements are currently being determined. ($25)	Western will participate in the Kansas transmission project through initial payments to a non-federal entity (Sunflower Electric Cooperative, Inc.) to partially fund new transmission facilities (the Holcomb-Clyman 345-kV Transmission Line in Kansas and Oklahoma) in return for transmission capacity. ($1,072)
	No activity. ($0)	Engineering work will begin for the 22-mile Hoehne-Ramsey 138-kV Transmission Line in Colorado. ($100)	Construction is scheduled to begin on the Hoehne-Ramsey 138-kV Transmission Line. The line will contribute to the reliability of Western's system by providing an additional 138-kV transmission path and will ensure capacity for Western's customers. ($4,467)
	Engineering planning work continued on the Mead-Adelanto Intertie in Southern Nevada and California. ($1,290)	Engineering planning work will continue on the Mead-Adelanto Intertie. Western is a minority participant with other utilities. Cost-sharing arrangements are currently being determined. ($1,031)	Western will begin payments to the project manager (the City of Los Angeles Department of Water and Power) for engineering development and equipment costs for a 500-kV AC line from southern Nevada to southern California. ($12,449)
	Engineering studies, field surveys, environmental work, design and specification preparation, and land and rights activities continued to be performed by Western on various transmission line additions and upgrades. Western continued its participation with others for work in Arizona, California, and Nevada on the Mead-Phoenix Intertie and the Mead-Northwest Intertie. Planning and engineering studies were also underway. ($15,073)	Preconstruction activities, engineering studies, and land and rights activities will be performed on various transmission line additions and upgrades, including the Northern Arizona transmission project; the Shiprock-Albuquerque transmission project in New Mexico; the Curecanti-Montrose, Curecanti-Lost Canyon, Lost Canyon-Shiprock, and Rifle-Curecanti transmission lines in Colorado and New Mexico; the Fort Peck-Wolf Point 230-kV Transmission Line in Montana; the Blue River-Summit 115-kV Transmission Line in Colorado; and the Thermopolis-Carter Mountain 115-kV Transmission Line in Wyoming. Engineering studies and land and rights activities will continue to	Preconstruction activities, engineering studies, and land and rights activities will be performed on various transmission line additions and upgrades, including the Northern Arizona transmission project at $6.0 million; the Utah transmission system at $3.5 million; the Shiprock-Albuquerque transmission project in New Mexico at $2.1 million; the Curecanti-Montrose, Curecanti-Lost Canyon, Lost Canyon-Shiprock, and Rifle-Curecanti 345-kV transmission lines in Colorado and New Mexico; the Fort Peck-Wolf Point 230-kV Transmission Line in Montana; and the Blue River-Summit 115-kV Transmission Line in Colorado.

III. Construction and Rehabilitation

Program Activity	FY 1989	FY 1990	FY 1991
Transmission Lines and Terminal Facilities (continued)		be performed on the Mead-Phoenix Intertie and the Mead-Northwest Intertie to connect the Pacific Northwest and Pacific Southwest regions. ($7,300)	Engineering studies and right-of-way activities will also continue for the Mead-Northwest and Mead-Phoenix Interties, service to DOE's Nevada test site, and for the Spence-Miracle Mile-Archer Transmission Line, Wyoming at $2.3 million. Preconstruction activities are an essential part of Western's construction program which is required in order for Western to continue to satisfy obligations for the delivery of power. The requirements for the delivery of power change as the interconnected power systems, of which Western is a part, grow and evolve. As a result of interconnections, transmission line loading is no longer solely a function of Western's resources and loads but is influenced by the load and resource arrangements of the systems with which it interconnects. Furthermore, disturbances in one system reflect throughout the interconnected systems. Thus, to assure reliable operation of its transmission system, Western must rehabilitate, upgrade, or replace transmission facilities which have reached the end of their useful service, have become overloaded, or have sustained damage. ($14,470)
Total, Transmission Lines and Terminal Facilities	$72,539	$50,675	$66,130
Substations	Work was accomplished at numerous substations in Western's 15-state service area. The purpose of substation work activities is to improve system reliability and operational efficiency in order to better serve Western's customers at their points of power delivery. Western's substations are constructed in stages, e.g., construction may proceed from stage 01 (initial development of the site, structures, and equipment), to stage 02	Work will be underway or completed at the following sites: Grand Island Substation 06 (Nebraska), Mission Substation Reactor 05 (South Dakota), Watertown Substation Static Var System (South Dakota), Ault Substation Stage 04 Additions (Colorado), Spence Substation 01 (Wyoming), Folsom Substation 03 (California), Mesa Substation 03	Work will continue or begin at the following sites: Basic Substation 07 (Nevada) including $4.6 million for consolidation of old facilities to a new substation; Coolidge Substation 07 (Arizona); Folsom Substation 03 (California); Hoyt Substation 02 and Kiowa Creek Substation 01 (Colorado); Bridgeport Substation 02 (Wyoming); Malin substation (Oregon), including approximately $7.6 million for replacement of series capacitors. Work

III. Construction and Rehabilitation

Program Activity	FY 1989	FY 1990	FY 1991
Substations (continued)	(addition of a new bus with circuit breakers to serve a new customer), to stage 03 (construction of a new control building to house circuit breaker control panels, communications equipment, etc.). Most of the work in FY 1989 continued the purchase and installation of various substation equipment, such as circuit breakers, transformers, telecommunication equipment, and supervisory control and data acquisition equipment. Work was underway or completed at the following sites: Flandreau Substation 07 (South Dakota), Grand Island Substation 05 (Nebraska), Mission Substation Reactor 05 (South Dakota), Sioux City Substation 10 (Iowa), Dawson County Substation 05 (Montana), Bismarck Substation 07 (North Dakota), Coolidge Substation 06 (Arizona), Spence Substation 01 (Wyoming), Glen Canyon Switchyard 04 (Arizona), Midway Substation 03 (Colorado), and Curecanti Substation 04 (Colorado). Federal ($ 8,954) Non-Federal (2,239) Total ($11,193)	(Arizona), Curecanti Substation Transformer 06 (Colorado), and Midway Substation Transformer 03 (Colorado). Federal ($24,749) Non-Federal (1,967) Total ($26,716)	will also begin on Jamestown Substation 11 (North Dakota), including electrical equipment acquisition at $2.2 million; Wolf Point Substation 02 (Montana), including upgrade of facilities at $2.6 million to improve reliability of service; Watertown Substation Static Var System (South Dakota); Flatiron Switchyard 02 (Colorado) to improve reliability; Boysen Substation 02 (Wyoming); Fort Morgan West Substation 01 (Colorado); Alcova Substation Modifications (Wyoming); Copper Mountain Substation 01 (Colorado); Davis Switchyard 04 (Arizona) at $2.4 million to improve safety, reliability, and interconnection with other utilities; Western Colorado Capacitor Banks (Colorado); improvement of 138-kV service to the Garkane (Utah) Power Association from Glen Canyon Switchyard 05 (Arizona) at $2.4 million; and Glen Canyon Switchyard 06. Work will begin for Tracy Substation 03 modifications (California) at $1.8 million to increase reliability and improve maintenance operations. Federal ($32,886) Non-Federal (1,524) Total ($36,490)
Total, Substations	$ 8,954	$24,749	$33,886
Other Facilities	Work was completed on the Billings Area microwave system. ($300) Work continued on the Salt Lake City Area microwave system. ($2,011) No activity. ($0)	No activity. ($0) Work will continue on the Salt Lake City Area microwave system. ($2,532) No activity. ($0)	No activity. ($0) Work will be completed on the Salt Lake City Area microwave system. ($870) Work will begin on an addition to the Sacramento, California, microwave system, including a communication system in the San Joaquin Valley and a repeater site in the northern area to Keswick Substation. ($900)

III. Construction and Rehabilitation

Program Activity	FY 1989	FY 1990	FY 1991
Other Facilities (continued)	Western continued to purchase and install miscellaneous system additions, such as microwave equipment, telecommunications equipment, and Supervisory Control and Data Acquisition (SCADA) equipment for substantially completed facilities. This equipment is required to replace worn out components and facilities which are beyond their useful service lives and to upgrade overloaded equipment with higher capacity components to lower maintenance costs and avoid outages. ($7,742)	The purchase and installation of SCADA equipment, transformers, microwave equipment, and other additions to substantially completed facilities will continue. ($6,000)	Western will continue to acquire and install miscellaneous system additions. ($3,946)
	Continued studies to enhance SCADA systems in the Billings, Montana, and Boulder City, Nevada, Areas. ($75)	Western will initiate activities to acquire and install equipment to enhance SCADA operations in Western's Boulder City Area. Studies will continue for the Billings, Montana, system. A highly efficient and effective SCADA system is critical to power system operations. ($3,944)	Work will continue on the acquisition and installation of SCADA systems. ($2,670)
	No activity. ($0)	No activity. ($0)	Work will begin on construction of control buildings to house electrical control and protection equipment at Glen Canyon and Shasta Switchyards in California. ($1,230)
	Engineering and construction activities were conducted for various service center additions and modifications. The centers support Western's transmission line, substation, and communication maintenance crews. At the larger complexes, there are various types of shops, storage buildings, garages, warehouses, and vehicle service centers. Activities during the year are listed below:	Engineering and construction activities will be conducted for various service center additions and modifications. The centers support Western's transmission line, substation, and communication maintenance crews. At the larger complexes, there are various types of shops, storage buildings, garages, warehouses, and vehicle service centers. Activities during the year are listed below:	Engineering and construction activities will be conducted for various service center additions and modifications. The centers support Western's transmission line, substation, and communication maintenance crews. At the larger complexes, there are various types of shops, storage buildings, garages, warehouses, and vehicle service centers. Activities during the year are listed below:
	Construction activities were completed on the Power Marketing Operations Complex additions at Loveland, Colorado, including shops for communication, relay, and meter crews. ($64)	No activity. ($0)	No activity. ($0)

III. Construction and Rehabilitation

Program Activity	FY 1989	FY 1990	FY 1991
Other facilities (continued)	No activity. ($0)	Design activities will begin for a hazardous waste storage building at Sioux City, Iowa. ($507)	Construction will begin for a hazardous waste storage building at Sioux City to accordance with DOE's environmental, safety, and health plan. ($713)
	Design work was undertaken on modification and improvement of the maintenance yard and buildings at the Phoenix District Operation and Maintenance (O&M) Center in Arizona. ($31)	Construction activities will commence on the modification at the Phoenix District O&M Center. Construction of new facilities for power dispatching, supervisory control and data acquisition, and communications will improve power dispatch and maintenance functions and will enhance safety. ($4,900)	Construction will continue on modifications at the Phoenix District O&M Center. ($7,228)
	Engineering studies and preconstruction design work were performed for the expansion of facilities at Mead Substation (Nevada) including addition of a warehouse and maintenance building. ($275)	Increased power system responsibilities at Mead Substation (Nevada), including recent Hoover Powerplant Switchyard consolidation work, have crowded existing facilities. Western will initiate site development work to construct a warehouse and maintenance shop building on substation grounds, primarily for crews of electricians, communication technicians, and meter and relay mechanics. ($222)	Construction will be completed for a warehouse and maintenance building at the Mead Substation operation and maintenance complex. ($3,842)
	No activity. ($0)	No activity. ($0)	The Bureau of Reclamation will transfer approximately 50 acres of land to Western, allowing for expansion at Tracy Substation in California and for separation of operation and maintenance functions. Western will finance the costs associated with replacing and modifying existing Reclamation maintenance facilities impacted by the land transfer. ($500)
Total, Other facilities	$10,491	$16,089	$20,515

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III. Construction and Rehabilitation

Program Activity	FY 1989	FY 1990	FY 1991
Construction and Rehabilitation Budget Authority	$81,904	$83,617	$130,630
Use of Unobligated Balances	$ +913	$+3,000	$ 0
Total, Construction and Rehabilitation	$82,899	$87,117	$130,630

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CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
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KEY ACTIVITY SUMMARY

CONSTRUCTION AND REHABILITATION

IV. A. Power System Construction Summary - Activity line item selection criteria basis: major FY 1991 construction with total costs of $5,000,000 or greater.

Power System/Activity	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Remaining Balance	Total Estimated Cost 1/
Central Valley Project					
Cottonwood-Elverta No. 3 230-kV T.L.	$ 515	$ 75	$ 6,240	$ 0	$ 6,830
Transmission Lines and Terminal Facilities	20,977	2,691	2,010	146,560	172,238
Tracy Substation Stage 03	0	0	1,800	5,500	7,300
Substations	5	1,124	2,305	1,688	5,122
Other	19,788	100	2,718	12,061	34,667
Subtotal	$ 41,285	$ 3,990	$ 15,073	$165,809	$ 226,157
Parker-Davis Project					
Liberty-Phoenix 230-kV T.L.	$ 1,867	$ 5,083	$ 1,631	$ 0	$ 8,581
Transmission Lines and Terminal Facilities	42,047	1,785	1,866	37,105	82,803
Basic Substation Stage 03	0	2,861	4,598	6,867	14,326
Substations	10,736	1,942	4,619	3,695	20,992
Phoenix District O&M Center Rehabilitation	431	4,900	7,236	3,809	16,376
Other	2,701	6,030	0	200	8,931
Subtotal	$ 57,782	$22,601	$ 19,950	$ 51,676	$ 152,009

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KEY ACTIVITY SUMMARY (Continued)

CONSTRUCTION AND REHABILITATION

IV. A. Power System Construction Summary (Continued)

Power System/Activity (Cont)	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Remaining Balance	Total Estimated Cost 1/
Pacific Northwest-Pacific Southwest Intertie					
Mead-Adelanto AC Intertie	$ 1,337	$ 1,031	$ 12,449	$ 40,502	$ 55,319
Transmission Lines and Terminal Facilities	7,133	1,566	2,372	110,980	122,051
Malin Substation Series Capacitors	0	0	7,803	5,965	13,768
Substations	97	100	98	7,646	7,941
Other	2,733	222	3,042	0	5,997
Subtotal	$ 11,300	$ 2,919	$ 25,764	$165,093	$ 205,076
Pick-Sloan Missouri Basin Program 2/					
Charlie Creek-Belfield 345-kV T.L.	$ 8,134	$ 16,689	$ 2,006	$ 0	$ 26,829
Kansas Transmission Project	10	25	1,072	13,111	14,218
Limestone-Gering-Bayard-McGrew 34.5/69-kV Transmission Line Upgrade	438	1,974	895	11,704	15,011
Lovell-North Cody-Big George 115-kV T.L. Upgrade	7,339	485	1,993	0	9,817
Miracle Mile Transmission Consolidation Project	2,268	5,758	483	425	8,934

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KEY ACTIVITY SUMMARY (Continued)

CONSTRUCTION AND REHABILITATION

IV. A. Power System Construction Summary (Continued)

Power System/Activity (Cont)	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Remaining Balance	Total Estimated Cost 1/
Pick-Sloan Missouri Basin Program (Cont)					
Sidney-North Yuma 230-kV Transmission Line	1,239	1,581	5,070	330	8,220
Transmission Lines and Terminal Facilities	119,441	2,810	4,137	145,141	271,529
Fort Morgan West Substation Stage 01	239	299	416	4,777	5,731
Watertown Substation Static Var Compensator	174	7,789	404	522	8,889
Substations	95,282	6,867	10,216	20,609	132,974
Upgrade SCADA System (Billings Area)	0	378	2,570	6,500	9,448
Other	46,709	5,952	1,221	7,014	60,896
Subtotal	$281,273	$ 50,607	$ 30,483	$210,133	$ 572,496
Colorado River Storage Project					
Meeker-Rangely 138-kV T.L.	$ 0	$ 106	$ 4,467	$ 1,851	$ 6,424
Transmission Lines and Terminal Facilities	75,612	6,771	9,417	263,856	355,656
Substations	10,575	3,766	1,607	7,496	23,444
Other	8,303	2,757	3,759	4,305	19,124
Subtotal	$ 94,490	$ 13,400	$ 19,250	$277,508	$ 404,648

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CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
(dollars in thousands)

KEY ACTIVITY SUMMARY (Continued)

CONSTRUCTION AND REHABILITATION

IV. A. Power System Construction Summary (Continued)

Power System/Activity (Cont)	Total Prior Year Obligations	FY 1990 Appropriated	FY 1991 Request	Remaining Balance	Total Estimated Cost 1/
Total Obligations, Western	$486,130	$ 93,517	$110,520	$870,219	$1,560,386

FOOTNOTES TO KEY ACTIVITY SUMMARY:

1/ Western funds only.

2/ Includes estimates for the Fort Peck Project construction activities and Western Headquarters capitalized movable equipment acquisitions.

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FACILITIES

1. California-Oregon Transmission Project
2. Malin Substation Series Capacitors
3. Cottonwood-Elverta No. 3 230-kV T.L.
4. Roseville-Elverta No. 2 230-kV T.L.
5. Tracy Substation, Stage 03
6. Lovell-North Cody-Big George 69 & 115-kV T.L.
7. Miracle Mile Transmission Consolidation
8. Wolf Point Substation, Stage 02
9. Charlie Creek-Bellfield 345-kV T.L.
10. SCADA System Upgrade (Billings Area)
11. Watertown Substation Static Var Compensator
12. Limestone-Gering-Bayard-McGrew 34.5/69-kV T.L.
13. Sidney-North Yuma 230-kV T.L.
14. Kansas Transmission Project
15. Meeker-Rangely 138-kV T.L.
16. Phoenix O&M Center Modifications
17. SCADA System Upgrade (Boulder City Area)
18. Mead-Adelanto AC Intertie
19. Basic Substation, Stage 03

WESTERN AREA POWER ADMINISTRATION

FY 1991 MAJOR FACILITY CONSTRUCTION

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KEY ACTIVITY SUMMARY

CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE

I. Preface: Operation and Maintenance

The goals of Western's operation and maintenance (O&M) activity are to meet the national energy policy objectives by fostering an adequate supply of reliable energy in a safe, cost-effective manner. These goals are achieved by maintaining continuity of service through a well maintained power system, rapidly restoring service following any system disturbances, and maximizing the revenues gained from energy sales.

In FY 1991, electric power marketed by Western will be generated at 51 hydropower plants which are operated by the Bureau of Reclamation (BuRec), the Corps of Engineers (COE), and the International Boundary and Water Commission (IBWC). Western also markets the United States entitlement from the Navajo coal-fired powerplant near Page, Arizona. Western's power marketing function evolved over a period of years as BuRec, COE, and IBWC multipurpose water development projects were authorized. Each project is administered as an independent entity in terms of authorizing legislation and repaying the reimbursable portion of project investment. Western's power marketing revenues for each project must be sufficient to meet the cost of O&M of the associated transmission and generation facilities (including replacements and purchase power and wheeling) and to repay with interest the capital investment in Western's power facilities along with those of the generating facilities. In addition, power revenues must help repay the investment in associated Federal irrigation facilities that is beyond the water users' ability to repay and to help repay certain other nonpower costs assigned to power for repayment.

As of September 30, 1989, the investment to be repaid by Western's power systems totaled about $5.0 billion, of which $2.1 billion has been repaid. Cumulative total operating revenues were $8.7 billion. This sum has provided $3.3 billion for operation and maintenance, $1.8 billion for purchase power, $1.5 billion for interest, and $2.1 billion for repayment of investment in facilities and assistance to irrigation. These amounts include revenues from power systems funded through Western's Revolving Fund (see Colorado River Basins Power Marketing Fund).

Since its creation in 1977, Western has developed comprehensive project marketing plans when existing power sale contracts expire. Each plan receives extensive public exposure. The plans help ensure that Western carries out its power marketing role in the public interest consistent with congressional intent. Western staff writes, reviews, revises, and negotiates power sales and facilities contracts with over 600 customers. Western sells power to customers consisting of cooperatives, municipalities, public utility districts, investor-owned utilities, State and Federal agencies (including Department of Energy national laboratories), and irrigation districts. The wholesale power customers, in turn, provide services to millions of retail consumers.

Equipment replacements, such as circuit breakers, transformers, revenue meters, switches, control boards, relays, and oscillographs are normally scheduled according to length of service, usage, and current maintenance costs. Some substation equipment is replaced in response to changing loads, resources, and other electrical characteristics of neighboring utilities on the interconnected transmission system. A point is reached where it is more economical to replace old equipment rather than continually incur repair cost. Replacing the old equipment with new equipment, which often has a longer life due to technological improvements, produces a lower annual life cost. Most maintenance and repair equipment is stationed at Western's service centers.

Western's conservation and renewable energy program addresses a wide range of activities such as conservation technologies; generation and transmission improvements; cogeneration applications; and renewable resources in the solar, geothermal, biomass, and small-scale hydro technologies. This assistance takes the form of technology transfers, engineering technical assistance, equipment loans, and cost-shared project development.

There are two subactivities listed in Section III which describe Western's overall O&M activity: (1) regular O&M and (2) replacements and additions. The subactivities are divided into subelements (e.g., facility and systemwide expenses under the regular O&M activity) in order to more fully describe O&M accomplishments and the FY 1991 budget request.

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KEY ACTIVITY SUMMARY

CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE

II. A. Summary Table

Program Activity	FY 1989	FY 1990 Estimate	FY 1991 Request	FY 1991 $ Change
Regular O&M	$ 79,389	$ 93,365	$ 98,778	+ 6
Replacements and Additions	11,072	7,113	16,731	+135
Subtotal, O&M Budget Authority	$ 90,461	$100,478	$115,509	+ 15
Use of Unobligated Balances	+1,589	+7,368	-0-	-
Total O&M	$ 92,050	$107,846	$115,509	+ 7

III. Operation and Maintenance Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
Regular O&M	Facility Expenses. Western maintained and operated over 16,500 miles of high-voltage transmission lines (13,000 miles under this appropriation and 3,500 miles under the Colorado River Basins Power Marketing Fund) and 250 substations for power delivery to its customers. Funds were used to provide for the basic operating costs necessary to maintain substations and transmission lines in accordance with electric utility industry standards. Wages and salaries were paid to linemen, electricians, electronic equipment mechanics, meter and relay mechanics, electrical engineers, and electronics engineers. Travel costs supported crews often working in relatively isolated locations. Commercial sources provided support activity such as vehicle maintenance and electrical equipment repair. Service centers, warehouses, and garages were maintained to meet the needs of recurring maintenance work, as well as to provide supplies and services in response to extraordinary conditions, such as line repair during severe storms.	Facility Expenses. Western will continue to operate and maintain a high-voltage transmission system to assure reliable and efficient service to our customers. Western's extensive data communications and control systems (such as microwave and supervisory control and data acquisition systems) will be maintained to monitor and control power delivery within the interconnected power systems. About 102 miles of transmission line will be added to the regular maintenance program. Western will continue assessments at its facilities to determine the extent of cleanup of environmental pollutants (such as oil contaminated with polychlorinated biphenyl) necessary for environmental compliance. Cleanup at some sites will be initiated. ($74,196)	Facility Expenses. This level provides for continued maintenance of electrical and communication facilities. Three new substations and about 38 miles of transmission line will be added to the maintenance program. Additional facilities increase the need for basic supplies, equipment, and stock items, such as crossarms, insulators, and framing hardware for repair. This level also provides for erosion control along access roads and substations, wood pole treatment, and continuation of cleanup and assessments of environmental pollutants. ($77,988)

III. Operation and Maintenance Activity Descriptions (Cont'd)

Program Activity	FY 1988	FY 1990	FY 1991
Regular O&M (continued)	Western participated with other utilities (as a potentially responsible party) in a toxic waste site cleanup under the Comprehensive Environmental Response Compensation and Reliability Act (Superfund Act) regulations. Western adopted a revised method of distributing indirect costs. As a result, a greater portion of the total Western-wide indirect costs are considered a current period operating expense of the O&M activity and reported under Facility Expenses. ($81,847) Systemwide Expenses. Western provided continuing services necessary for the overall operation of its separate power systems, such as the Pick-Sloan Missouri Basin Power System in the Rocky Mountain and northern plains states; the Parker-Davis Power System in southern California, Nevada, and Arizona; and the Central Valley Power System in northern California. Services included system operations and load dispatching, power billing and collecting, power marketing, general power resources planning, and conservation and renewable energy program activities. Power generation and transmission were directed from Western's five dispatch centers. Equipment at the power dispatching centers have allowed Western to more effectively use its transmission system and respond to system disruptions, thereby providing better customer service. In addition, the installation of remote control and monitoring equipment at distant delivery points has allowed for unmanned substations and provided "real time" information to power system dispatchers.	Systemwide Expenses. Most of the work under this subelement is of a continuing nature. Power will be marketed, repayment studies completed, and revenue collected. Western will continue to improve its marketing and ratemaking practices. For example, projects in the Loveland and Salt Lake City Areas have been integrated for marketing, contractual, and ratemaking purposes. This saves time and administrative expenses. Under this appropriation, Western expects gross operating revenues of about $812 million with energy sales of 29.7 billion kilowatthours. ($10,100)	Systemwide Expenses. This level provides for continued marketing, scheduling, dispatching, and billing of Western's energy resources. New initiatives under the conservation and renewable energy program are proposed. Western expects $810 million in gross operating revenues from energy sales totaling about 29.5 billion kilowatthours to repay capital investment, operation and maintenance expenses, purchase power and wheeling expenses, and other costs required by law. As a result of the Administration's repayment reform proposal, an additional $142 million and $2 million would be collected by the Department of Energy and the State Department, respectively. ($20,790)

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III. Operation and Maintenance Activity Descriptions (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Regular O&M (continued)	Gross operating revenues were about $445 million with energy sales of 28.4 billion kilowatthours. ($18,342)		
Total, Regular O&M	$79,389	$83,364	$90,778
Replacements and Additions	Electrical Equipment. Items of electrical equipment (such as circuit breakers, transformers, switches, relays, and oscillographs) were replaced in substations and switchyards. Replacements were scheduled in response to length of service criteria or excessive maintenance costs. ($5,866)	Electrical Equipment. Purchase of replacement equipment will continue to assure reliable service. For instance, mobile substations which are 30 years old must be replaced so they are dependable in emergency situations. The Morris Substation transformer in Minnesota must be replaced to prevent voltage fluctuations and high maintenance costs. ($3,142)	Electrical Equipment. Obsolete and worn out circuit breakers and transformers will be replaced. Failure of these breakers jeopardizes system reliability. Substation switches deteriorate due to weather and mechanical wear. Failure of these switches causes a hazard to adjacent equipment and customer equipment. Obsolete control boards will be replaced at Tracy Substation in California. These boards are 30 years old; the normal service life is 25 years. ($7,431)
	Communication and Control Equipment. Western maintained an extensive system of data communications used to operate the interconnected power system. Installation of microwave network equipment and supervisory control and data acquisition (SCADA) equipment allowed highly reliable monitoring and control of power delivery to customers. ($1,096)	Communication and Control Equipment. Western will continue to replace and upgrade microwave, SCADA, and other communication and control equipment. SCADA equipment in the Central Valley Project power system (California) will be upgraded. Telemetering equipment will be upgraded, and old and unsafe radio towers will be replaced in the Pick-Sloan Missouri Basin Program power system in South Dakota. A microwave system will be added at the Dale Substation in Montana. ($804)	Communication and Control Equipment. Acquisition of communication equipment will continue. Portions of microwave systems will be replaced, upgraded, or expanded in four power systems. Revenue meters will be replaced in the Sacramento (California) Area, and a communication system to gather revenue meter data will be added for more cost effective billing and load management. ($2,294)
	Capitalized Movable Equipment. Western upgraded and replaced capitalized movable equipment. Capitalized movable equipment includes such items as heavy trucks, special purpose vehicles (e.g., cranes, auger trucks, tractors, and pole trailer), office equipment, ADP equipment and software, and tools. ($4,295)	Capitalized Movable Equipment. To maintain the integrity of Western's computer systems, equipment must be upgraded. This will provide increased capacity for data processing and communication of Western's information. Obsolete peripheral equipment will be replaced. A helicopter, in its seventeenth year of service, will be replaced. This helicopter is required to patrol power lines and transport personnel and	Capitalized Movable Equipment. Five special purpose vehicles will be added and 8 replaced due to age and high maintenance cost. Vehicles such as an oil tank truck, truck with boom and bucket, and maintenance van are necessary for normal substation and line maintenance in the Loveland Area. An 18-year-old auger truck will be replaced due to substantial downtime and high repair costs. A bucket truck at the Phoenix District will enable maintenance crews to safely maneuver in small

III. Operation and Maintenance Activity Descriptions (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Replacements and Additions (continued)		materials to otherwise inaccessible areas (like mountain-top microwave sites) to the Parker-Davis Project (primarily Arizona). ($3,167)	switchyards. Smaller off handling trucks will be purchased for increased productivity and safety when electricians are performing circuit breaker maintenance. Replacement of four aerial lifts for line crews will improve operation efficiency and safety. Computer equipment will continue to be upgraded to maintain system integrity. ($7,000)
	Maintenance Facilities. Reroofing Mead Substation will be completed. ($25)	Maintenance Facilities. No activity. ($0)	Maintenance Facilities. No activity. ($0)
Total, Replacements and Additions	$11,072	$ 7,113	$ 10,736
Operation and Maintenance Budget Authority	$90,461	$100,470	$115,580
Use of Unobligated Balances	$+1,589	$ +7,200	$ -0-
Total, Operation and Maintenance	$92,050	$107,670	$115,580

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(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE

I. Preface: Purchase Power and Wheeling

The objective of the Purchase Power and Wheeling (PP&W) activity is to obtain the electrical resources and transmission capabilities to supplement Federal hydropower supplies needed to meet Western's contractual obligations. Transmission wheeling services are purchased when a third party's transmission lines are needed to deliver Federal power to Western's customers. Appropriations are primarily earmarked for the Central Valley Project in California and are decreasing primarily due to use of planned unobligated balances.

In order to minimize the need for appropriations, alternative financing arrangements, such as bill crediting, reimbursable authority, net billing, and nonappropriation transfers, are used to fund a substantial portion of the PP&W program activity. In FY 1991, these alternative financing arrangements account to approximately $124.7 million or 55.5 percent of the total PP&W program of $224.7 million. These alternative methods of financing decrease Western's appropriations requirements but also result in a corresponding reduction in receipts deposited to the Treasury.

The FY 1990 Energy and Water Development Appropriation Act provides that the continuing fund established by Public Law 99-141 (99 Stat. 575) shall also be available on an ongoing basis for defraying PP&W expenses when the Administrator determines that such expenditures are necessary to meet contractual obligations for the sale and delivery of power during periods of below-normal hydropower generation.

There are two budget subactivities in Purchase Power and Wheeling--Central Valley Project and Other Projects, consisting of the Boulder Canyon, Pick-Sloan Missouri Basin Program, Fryingpan-Arkansas, Parker-Davis, Pacific Northwest-Pacific Southwest Intertie, and Rio Grande Projects. Subactivities are further divided into Energy, Wheeling, and, for the Central Valley Project, Capacity.

II. A. Summary Table

Program Activity	FY 1989	FY 1990 Estimate	FY 1991 Request	FY 1991 $ Change
Central Valley Project	$ 77,946	$ 76,393	$ 52,999	-31
Other Projects	10,754	23,830	19,436	-18
Subtotal, Purchase Power and Wheeling Budget Authority	$ 88,700	$100,223	$ 72,435	-28
Use of Unobligated Balances	-987	-0-	27,565	-
Subtotal, Purchase Power and Wheeling	$ 87,713	$100,223	$100,000	0
Alternate Financing	136,970	142,729	124,680	-13
Total, Purchase Power and Wheeling	$224,683	$242,952	$224,680	- 8
Financing				
Appropriations	$ 87,713	$100,223	$100,000	0
Bill Crediting	71,830	70,000	70,000	0
Net Billing	18,799	24,403	13,401	-45
Reimbursable From Other Federal Agencies	36,760	38,350	38,350	0
Nonappropriation Transfers	9,581	9,976	2,929	-71
Total	$224,683	$242,952	$224,680	- 8

III. Activity Descriptions: Purchase Power and Wheeling (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Central Valley Project	Energy. Continued purchasing energy from Pacific Gas and Electric Company (PG&E), Bonneville Power Administration (BPA), Basin Electric Power Cooperative (Basin), and Pacific Northwest entities, to meet Western's contractual commitments in the Central Valley Project. Of the $80,931,000 of appropriated funds available for this activity, $25,000,000 is from prior-year unobligated funds. ($85,931)	Energy. Continue purchasing energy from various sources to meet Western's contractual commitments. The budget is based on average water conditions. ($44,012)	Energy. Continue purchasing energy from various sources to meet Western's contractual commitments. The budget is based on average water conditions. Increased energy purchases from the Pacific Northwest are anticipated because of termination of purchases from Basin. The budget also assumes favorable energy rates (rates held to approximately the FY 1989 level) for Pacific Northwest energy purchases. A reduced level of energy purchases and lower rates are expected from PG&E bank account No. 2. In addition, a further reduction in purchases from the BPA is expected, reducing the level of non-appropriations transfers. Also, a reduced level of energy sales to PG&E reduces the level of net billing. A $70.0 million level of bill crediting is assumed. Of the $41,237,000 of appropriated funds to be available for this activity, $27,566,000 consists of planned unobligated balances. ($13,672)
	Capacity. The Central Valley Project has a Project Dependable Capacity level that is less than the customer energy peak load of 1152 MW. In order to support the customer peak level, Western purchased capacity from PG&E. Western implemented reimbursable financing with Federal customers during 1989. ($7,339)	Capacity. Continue to purchase capacity from PG&E to ensure that Western has sufficient capacity to meet its customers' peak demands and provide adequate funding for escalating capacity rates. Western is presently disputing the capacity value of the Central Valley Project (Project Dependable Capacity) and of various Pacific Northwest power purchases (capacity credit) with PG&E. Western's budget assumes that these capacity disputes will be settled by FY 1990 and Western's position on these issues will be substantially upheld. ($17,841)	Capacity. Continue to pay capacity charges to PG&E to ensure that Western has sufficient capacity to meet its customer's peak demands. An increased level of capacity purchases from PG&E is expected due to termination of capacity credits from Basin. ($36,068)

III. Activity Descriptions: Purchase Power and Wheeling (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Central Valley Project (continued)	Wheeling. Western used PG&E's transmission and distribution system to deliver energy to Western's Central Valley Project customers. Western pays PG&E for this wheeling service. ($14,676)	Wheeling. Continue to pay wheeling charges to PG&E to transport Western's energy over their transmission system. ($14,540)	Wheeling. Continue to pay wheeling charges to PG&E to transport Western's energy over their transmission system. The FY 1991 budget reflects an increase in PG&E's wheeling rate. ($2,388)
Total, Central Valley Project	$ 77,946	$ 76,393	$ 52,988
Other Projects	Energy. Purchased energy to meet obligations for the Pick-Sloan Missouri Basin Program and the Fryingpan-Arkansas Project. Budget levels vary due to seasonal fluctuations in the Missouri River Basin and Colorado River Basin hydrosystems. Of the $8,838,000 budgeted for this activity, $2,056,000 was from prior year unobligated funds. ($8,782)	Energy. Continue purchase of energy to meet Western's obligations. The Pick-Sloan Missouri Basin Program and Fryingpan-Arkansas Project will require additional budget authority to purchase energy to firm up capacity under the post-FY 1989 marketing plan. ($16,160)	Energy. Continue purchase of energy to meet Western's obligations. The budget is based on average water conditions rather than below-average water conditions assumed for FY 1990. The Pick-Sloan Missouri Basin Program and Fryingpan-Arkansas Project require budget authority to purchase energy to maintain capacity levels. ($12,180)
	Wheeling. Western used other utilities' transmission and distribution systems to deliver power to Western's customers. Western pays other utilities for this wheeling service. ($3,972)	Wheeling. Continue to pay other utilities to wheel Western's energy over their transmission systems. The Fryingpan-Arkansas Project will require additional wheeling to meet contractual agreements under the post-FY 1989 marketing plan. ($7,661)	Wheeling. Continue to pay other utilities to wheel Western's energy over their transmission system. ($7,247)
Total, Other Projects	$ 10,754	$ 23,830	$ 19,436
Total, Purchase Power and Wheeling Budget Authority	$ 88,700	$100,223	$ 72,436
Use of Unobligated Balances	$ -987	$ 0	$+27,564
Total, Purchase Power and Wheeling	$ 87,713	$100,223	$100,000

III. Activity Descriptions: Purchase Power and Wheeling (Cont'd)

Program Activity	FY 1989	FY 1990	FY 1991
Total Budget Authority	$271,145	$294,718	$298,484
Use of Unobligated Balances	$ +1,517	$+10,366	$+27,545
Total Program	$272,662	$305,184	$326,029

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OBJECT CLASS SUMMARY

CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE

		FY 1989 Actual	FY 1990 Estimate	FY 1991 Request
Direct Funding:				
11.1	Full-time permanent	$ 44,833	$ 45,249	$42,828
11.3	Other than full-time permanent	870	905	857
11.5	Other personnel compensation	1,740	1,810	1,713
11.9	Total personnel compensation	47,443	47,964	45,398
12.1	Personnel benefits: civilian	8,110	8,153	7,718
13.0	Benefits for former personnel	409	40	40
21.0	Travel and transportation of persons	4,101	4,098	4,233
22.0	Transportation of things	2,024	2,080	2,150
23.1	Rental payments to GSA	822	934	2,148
23.2	Rental payments to others	5,898	2,702	1,107
23.3	Communications, utilities, and miscellaneous charges	--	3,066	3,168
24.0	Printing and reproduction	420	434	448
25.0	Other services	116,359[1/]	151,108[1/]	157,967[1/]
26.0	Supplies and materials	8,694	8,721	9,008
31.0	Equipment	10,186	11,663	21,220
32.0	Lands and structures	68,166	64,358	71,382
42.0	Insurance claims and indemnities	30	36	40
99.0	Subtotal	272,682	305,357[2/]	326,028[2/]
	Reimbursable Obligations	49,641[2/]	142,330[2/]	164,700[2/]
TOTALS		$322,303	$447,687	$490,729
	Western also receives advances for cosponsored work from non-Federal entities under the Contributed Funds Act, primarily for participation in joint transmission system work, in the following amounts:	$ 26,078	$ 20,688	$ 21,515

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OBJECT CLASS (Continued)
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE

FOOTNOTES FOR OBJECT CLASS:

1/ Excludes the following alternative financing arrangements for the purchase power and wheeling program:

	FY 1989	FY 1990	FY 1991
Net Billing	$ 18,799	$ 24,403	$ 13,401
Bill Crediting	71,830	70,000	70,000
Nonappropriation Transfers	9,581	9,976	2,929
Total	$100,210	$104,379	$ 86,330

2/ Includes reimbursements from other Federal agencies to finance the purchase power and wheeling program activity in the following amounts:

FY 1989	FY 1990	FY 1991
$ 36,760	$ 38,350	$ 38,350

3/ Includes prior year unobligated balances of $11,139,000, of which $171,000 is from non-Federal reimbursement for the California-Oregon Transmission Project.

4/ Includes planned unobligated balances of $27,565,000.

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AMOUNTS AVAILABLE FOR OBLIGATION

CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE

	FY 1990	FY 1991
Appropriation	$294,218	$298,464
(Current Budget Authority)	(290,654)	(293,762)
(Permanent Budget Authority)	(3,564)	(4,702)
Receipts and Reimbursements:		
Unobligated Balances, Start of Year	38,704	27,565
Unobligated Balances, End of Year	-27,565	0
Collections from Federal Funds	56,410	58,774
Collections from Non-Federal Funds	85,920	105,926
Total, Obligations	$447,687	$490,729

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(dollars in thousands)

LEAD TABLE

COLORADO RIVER BASINS POWER MARKETING FUND

Activity	FY 1989	FY 1990 Estimate	FY 1991		Program Change Request vs Base	
			Base	Request	Dollar	Percent
Operation and Maintenance	$ 84,000	$ 99,000	$ 99,000	$115,800	$+16,800	+ 17%
Total, Obligational Authority	$ 84,000	$ 99,000	$ 99,000	$115,800	$+16,800	+ 17%
Staffing (FTEs)	240	240	240	240		

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SUMMARY OF CHANGES

COLORADO RIVER BASINS POWER MARKETING FUND

FY 1990 Obligational Authority	$ 99,000
FY 1991 Base	$ 99,000
Operation and Maintenance	
Increase in interest expenses on the unpaid capital investment of project facilities	$+15,600
Increase in purchased energy costs due to inflation and drought conditions	$ +900
Increase in wheeling costs due to a renegotiated contract	$ +300
FY 1991 Congressional Budget Request (Obligational Authority)	$115,800

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KEY ACTIVITY SUMMARY

COLORADO RIVER BASINS POWER MARKETING FUND

I. Preface: Operation and Maintenance

The Colorado River Basins Power Marketing Fund is Western's business-type revolving fund (Federal Public Enterprise Fund). Major activities associated with this revolving fund consist of power marketing and routine operation and maintenance of three power system transmission facilities. These three systems are the Colorado River Storage Project; the Fort Peck Project in Montana; and the Colorado River Basin Project in Arizona, including the Central Arizona Project and the United States entitlement from the Navajo coal-fired powerplant near Page, Arizona. Receipts from the sale of electric energy and capacity replenish the fund and are available for expenditure for operation, maintenance, power billing and collecting, purchase power and wheeling, interest, emergencies, and other power marketing expenses. Power sales and other revenues, which are collected in excess of expenses, are used for repayment of investments to the Treasury.

Each fiscal year's request (including the FY 1991 request of $115,000,000) is an obligational authority limitation only. Each fiscal year's amount represents Western's estimate of obligations to finance the business-type operations. Permanent budget authority was granted in each power projects' substantive legislation; therefore, budget authority is always available, and does not require current congressional appropriation action.

A significant part (over 50 percent) of the FY 1991 expense program is for power purchases. Past experience with unpredictable precipitation levels requires that Western request obligational authority for purchase power to meet firm energy needs in the event of below-normal hydropower generation. Therefore, Western's actual expenses may be less than the requested obligational authority during years of normal or above-normal hydropower generation, because Western is able to meet most of its firm power contractual needs from hydropower generation and buys less firming power from neighboring utilities. Likewise, expenses could exceed the requested obligation program during a year of extremely below-normal hydropower generation and Western may be required to request supplemental obligational authority to purchase energy to meet its firm power needs.

II. a. Summary Table

Program Activity	FY 1989	FY 1990 Estimate	FY 1991 Request	$ Change
Operation and Maintenance	$73,679	$99,000	$115,000	+17
Subtotal, Operation and Maintenance	$73,679	$99,000	$115,000	+17
Unused Obligational Authority	-0	-0	-0	-0
Total, Operation and Maintenance	$73,679	$99,000	$115,000	+17

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III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
Operation and Maintenance	Western had gross operating revenues of $134 million with sales of about 9.0 billion kilowatthours of energy from projects associated with this fund. Western continued to operate and maintain approximately 3,000 miles of transmission lines, substations, switchyards, communications, and control equipment. System operations activities, such as power marketing, dispatching, power billings, and collecting will continue. Cleanup of pollutants at Pinnacle Peak and Flagstaff Substations was initiated. Power revenues continued to be used to cover the Corps of Engineers' expenses for operation and maintenance of the Fort Peck Powerplant. The Bureau of Reclamation continued to transfer to Western completed transmission facilities of the Central Arizona Project for Western to operate and maintain. ($73,679)	Western expects gross operating revenues of $145 million with sales of about 9.0 billion kilowatthours of energy from projects associated with this fund. The obligation authority limitation increased by $15,000,000 primarily because of increased cost of purchased power and wheeling. Also, part of a 230-kV switchyard at Pinnacle Peak Substation (Arizona) and various special purpose vehicles and heavy trucks (which have reached age and/or mileage limits) will be replaced. Power revenues will continue to be used to cover the expenses for operation and maintenance of the Fort Peck Powerplant. ($99,000)	Western expects gross operating revenues of $138 million with sales of about 8.7 billion kilowatthours of energy. The obligation authority limitation increase is primarily due to an increase in interest expense as the Boors Ears-Bonanza (formerly known as Craig-Bonanza) 345-kV Transmission Line is capitalized. Purchased energy costs will also increase due to drought conditions. Wheeling costs will increase due to recent contract negotiations. In addition, $82 million would be collected as a result of the Administration's repayment reform proposal. Power revenues will continue to be used to cover the expenses for Fort Peck Powerplant, including extraordinary maintenance expenses for painting the Fort Peck Powerplant tunnel. ($110,000)
Total, Operation and Maintenance	$73,679	$99,000	$110,000

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
(dollars in thousands)

OBJECT CLASS

COLORADO RIVER BASINS POWER MARKETING FUND

		FY 1989 Actual	FY 1990 Estimate	FY 1991 Request
Direct Obligations:				
11.1	Full-time permanent	$ 7,483	$ 7,784	$ 8,160
11.3	Other than full-time permanent	150	155	164
11.5	Other personnel compensation	300	311	326
11.9	Total personnel compensation	7,933	8,250	8,650
12.1	Personnel benefits: civilian	1,321	1,402	1,470
21.0	Travel and transportation of persons	651	677	704
22.0	Transportation of things	215	222	229
23.1	Rental payments to GSA	213	200	210
23.3	Communications, utilities, and miscellaneous charges	428	443	457
24.0	Printing and reproduction	8	10	12
25.0	Other services	55,102	76,367	88,633
26.0	Supplies and materials	1,653	1,712	1,768
31.0	Equipment	1,370	1,419	1,532
32.0	Lands and structures	1,422	1,473	1,468
42.0	Insurance claims and indemnities	1	20	20
43.0	Interest and dividends	3,362	6,805	10,647
99.9	Total obligations	$ 73,679	$ 99,000	$115,800

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
SYSTEM STATISTICS

	1989	1990	1991
Generating Plants (No.)	51	51	52 3/
Generating Capacity:			
Maximum Operating Capability (kW)	10,407,446	10,477,446	10,516,446
Substations:			
Number	259	264	267 4/
Capacity (kVA)	18,676,047	20,294,548	20,847,048
Available energy: (MWh) 1/			
Project Energy 2/	27,056,720	31,987,667	30,890,667
Purchases	8,340,000	6,704,333	7,280,333
Energy available for marketing	35,396,720	38,692,000	38,171,000
Transmission lines: (circuit miles)			
500 kV	94.27	94.27	94.27
345 kV	1,554.40	1,656.40	1,691.40
230 kV	6,702.57	6,717.07	6,827.07
161 kV	1,031.86	1,031.86	1,031.86
138 kV	318.38	341.88	341.88
115 kV	5,744.32	5,732.52	5,699.52
69 kV and below	1,107.70	1,081.40	1,005.41
Total circuit miles	16,553.50	16,655.40	16,691.41
Western revenues: ($ in thousands)			
Gross operating revenues	$578,846	$657,099	$882,608 5/

1/ One megawatthour (MWh) equals one thousand kilowatthours (kWh).
2/ Energy delivered. Net of plant use and transmission losses.
3/ New generating plant - Shoshone in Wyoming.
4/ New substations - Beifield in North Dakota, Kiowa Creek Switching Station in Colorado, and Miracle Mile in Wyoming.

5/ Revenue estimates increase in FY 1991 to reflect proposed legislation to place power repayment practices on a more business like basis that provides straight-line amortization of the federal investment with interest on the unpaid balances accruing at current market interest rates.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
ENERGY SALES FOR FY 1989 THROUGH FY 1995 [1]

(In gigawatthours)[2]

PROJECT	ACTUAL FY 89	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95
Boulder Canyon Project	4,166	5,716	5,574	5,012	5,113	5,282	5,244
Central Valley Project	9,273	9,424	9,434	9,471	9,486	9,487	9,495
Colorado River Basin Project (Navajo)	2,604	1,905	1,636 [3]	1,406	1,406	1,406	1,406
Falcon-Amistad Project	290	313	313	313	313	313	313
Loveland Area Projects [4]	1,840	1,926	1,926	1,926	1,926	1,926	1,926
Pacific Northwest-Southwest Intertie [5]	0	0	0	0	0	0	0
Parker-Davis Project	1,282	1,543	1,496	1,337	1,337	1,337	1,337
Pick-Sloan Missouri Basin Program-Eastern Division [6]	9,417	10,563	10,579	10,625	10,625	10,439	10,403
Provo River Project	19 [9]	24	24	24	24	24	24
Salt Lake City Area Integrated Projects [7]	6,540 [8]	7,270	7,181	7,113	7,132	7,155	7,155
Washoe Project	7	8	8	8	8	8	8
SUBTOTAL	35,438	38,692	38,171	37,235	37,370	37,377	37,311
Less: Interproject Sales	-41	--	--	--	--	--	--
TOTAL	35,397	38,692	38,171	37,235	37,370	37,377	37,311

[1] Based on FY 1988 repayment studies with the exception of Pick-Sloan Missouri Basin Program, which uses the most current hydrology projections.

[2] One gigawatthour (GWh) equals one million kilowatthours (kWh).

[3] Energy sales decline because energy previously sold to Western's customers is being sold for project pumping.

4/ For operational and marketing purposes the Fryingpan-Arkansas Project and the Pick-Sloan Missouri Basin Program (Western Division) will be integrated into one resource in FY 1990. For this table, these projects were integrated in FY 1989.

5/ Pacific Northwest-Southwest Intertie shows no power sales, but reflects revenues (see next page). The Intertie Project is for transmission of electricity only, and power revenues are from the transmission of energy.

6/ These energy sales represent only the activities for the Eastern division of the Pick-Sloan Missouri Basin Program.

7/ For operation and marketing purposes the Collbran, Colorado River Storage, and the Rio Grande Projects were integrated into one resource in FY 1988.

8/ In FY 1989 there are 22 GWh of Salt Lake City Area integrated projects (SLCAIP) sales sold and marketed by Parker-Davis Project. These sales are also accounted for in Parker-Davis Project.

9/ The 19 GWh of Provo River Project sales sold and marketed through SLCAIP are also accounted for in SLCAIP.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
REVENUES FOR FY 1989 THROUGH FY 1995
EXCLUDES REPAYMENT REFORM

(dollars in thousands)

PROJECT	ACTUAL FY 89	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95
Boulder Canyon Project	$ 42,277	$ 48,383	$ 47,785	$ 44,800	$ 45,963	$ 47,018	$ 46,780
Central Valley Project	233,870	261,194	262,118	271,312	271,788	271,680	292,180
Colorado River Basin Project (Navajo) 1/	54,233	47,649	40,906	35,154	35,154	35,154	35,154
Falcon-Amistad Project	3,709	3,808	3,808	3,808	3,808	3,808	3,808
Loveland Area Projects 2/	27,947	32,407	33,303	33,303	33,303	33,303	33,303
Pacific Northwest-Southwest Intertie	4,326	5,267	5,432	5,432	5,432	5,432	5,432
Parker-Davis Project	20,292	20,392	19,969	18,520	18,520	18,520	18,520
Pick-Sloan Missouri Basin Program (Eastern Division) 3/	102,675	135,689 4/	141,409	142,099	142,099	135,150	134,598
Provo River	121 5/	238	238	238	238	238	238
Salt Lake City Area Integrated Projects 6/	89,974 7/	101,860	100,779	100,032	99,935	99,886	99,758
Washoe Project	117	212	211	212	212	212	211
SUBTOTAL	$579,541	$657,099	$655,958	$654,910	$656,452	$650,401	$669,982
Less: Interproject Sales 7/	-695	--	--	--	--	--	--
TOTAL	$578,846	$657,099	$655,958	$654,910	$656,452	$650,401	$669,982

1/ Revenues from the Colorado River Basin Project (Navajo) decrease between FY 1989 and FY 1992 because energy sales from this project are projected to decline over this period.

2/ For operational and marketing purposes the Fryingpan-Arkansas and the Pick-Sloan Missouri Basin Program (Western Division) will be integrated into one resource in FY 1990. For this table, these projects were integrated in FY 1989.

3/ These power revenues represent only the activities for the Eastern Division of the Pick-Sloan Missouri Basin Program.

4/ Revenues from the Pick-Sloan Missouri Basin Program (Eastern Division) increase in FY 1990 over previous years because a rate increase will take effect in October 1989.

5/ The $121,000 of Provo River Project Sales are marketed through Salt Lake City Area Integrated Projects (SLCAIP) and is accounted for in SLCAIP.

6/ For operation and marketing purposes the Collbran, Colorado River Storage, and the Rio Grande Projects were integrated into one resource in FY 1988.

7/ Of the SLCAIP revenues, $573,000 and $1,000 of the revenues are also accounted for in Parker-Davis Project and Pick-Sloan Missouri Basin Program, respectively.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
REVENUES FOR FY 1989 THROUGH FY 1995
INCLUDES REPAYMENT REFORM FY 1991 - 1995

(dollars in thousands)

PROJECT	ACTUAL FY 89	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95
Boulder Canyon Project	$ 42,277	$ 48,383	$ 47,785	$ 44,800	$ 45,963	$ 47,018	$ 46,780
Central Valley Project	233,870	261,194	274,771	287,311	289,705	290,042	311,122
Colorado River Basin Project (Navajo) 1/	54,233	47,649	40,906	35,154	35,154	35,154	35,154
Falcon-Amistad Project	3,709	3,808	5,607	5,421	5,331	5,208	5,072
Loveland Area Projects 2/	27,947	32,407	69,544	69,318	70,598	70,354	68,750
Pacific Northwest-Southwest Intertie	4,326	5,267	12,000	11,622	11,449	11,216	10,956
Parker-Davis Project	20,292	20,392	19,969	18,520	18,520	18,520	18,520
Pick-Sloan Missouri Basin Program (Eastern Division) 3/	102,675	135,689 4/	226,474	228,840	238,864	223,561	222,143
Provo River Project	121 5/	238	320	316	305	301	295
Salt Lake City Area Integrated Projects 6/	89,974 7/	101,860	184,574	182,045	183,700	183,298	181,346
Washoe Project	117	212	658	632	620	603	583
SUBTOTAL	$579,541	$657,099	$882,608	$883,979	$900,209	$885,275	$900,721
Less: Interproject Sales 7/	-695	--	--	--	--	--	--
TOTAL	$578,846	$657,099	$882,608	$883,979	$900,209	$885,275	$900,721

1/ Revenues from the Colorado River Basin Project (Navajo) decrease between FY 1989 and FY 1992 because energy sales from this project are projected to decline over this period.

2/ For operational and marketing purposes the Fryingpan-Arkansas and the Pick-Sloan Missouri Basin Program (Western Division) will be integrated into one resource in FY 1990. For this table, these projects were integrated in FY 1989.

3/ These power revenues represent only the activities for the Eastern Division of the Pick-Sloan Missouri Basin Program.

4/ Revenues from the Pick-Sloan Missouri Basin Program (Eastern Division) increase in FY 1990 over previous years because a rate increase will take effect in October 1989.

5/ The $121,000 of Provo River Project Sales are marketed through Salt Lake City Integrated Projects (SLCAIP) and is accounted for in SLCAIP.

6/ For operation and marketing purposes the Collbran, Colorado River Storage, and the Rio Grande Projects were integrated into one resource in FY 1988.

7/ Of the SLCAIP revenues, $573,000 and $1,000 of the revenues are also accounted for in Parker-Davis Project and Pick-Sloan Missouri Basin Program, respectively.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
POWER MARKETED AND WHEELED FOR OTHERS BY PROJECT

Project	State	No. of Plants 1/	Maximum Operating Capability-MW 1/	FY 1989 Actual Power-GWh	FY 1990 Estimated Power-GWh	FY 1991 Estimated Power-GWh
Power Marketed						
Boulder Canyon	AZ	1	0	793	1,389	1,340
	CA	0	0	2,324	2,861	2,814
	NV	0	0	1,049	1,467	1,420
Subtotal		1 2/	1,913 2/	4,166	5,717	5,574
Central Valley	CA	10	2,006	9,273	9,424	9,434
Colorado River Basin	AZ	1	547	284	152	131
(Navajo)	CA	0	0	1,433	1,734	1,489
	CO	0	0	522	0	0
	NV	0	0	365	19	16
Subtotal		1	547	2,604	1,905	1,636
Falcon-Amistad	TX	2	98	290	313	313
Loveland Area Projects	CO	7	459	912	1,009	1,009
	MT	0	151	0	0	0
	NE	0	0	397	471	471
	WY	9	266	531	446	446
Subtotal		16	876	1,840	1,926	1,926

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POWER MARKETED AND WHEELED FOR OTHERS BY PROJECT (Continued)

Project	State	No. of Plants	Maximum Operating Capability-MW	FY 1989 Estimated Power-GWh	FY 1990 Estimated Power-GWh	FY 1991 Estimated Power-GWh
Power Marketed (continued)						
Pacific Northwest-Southwest Intertie	AZ	0	0	0	0	0
	CA	0	0	0	0	0
	NV	0	0	0	0	0
Parker-Davis	AZ	1	269	635	1,080	1,049
	CA	1	69	320	71	65
	NV	0	0	327	392	382
Subtotal		2	338	1,282	1,543	1,496
Pick-Sloan Missouri Basin Program-Eastern Division	IA	0	0	1,383	1,827	1,829
	KS	0	0	0	184	184
	MN	0	0	0	2,520	2,523
	MT	3	429	847	921	923
	NE	0	0	1,756	1,758	1,761
	ND	1	546	1,287	1,510	1,513
	SD	4	1,833	1,874	1,843	1,846
Subtotal		8	2,808	9,417	10,563	10,579
Provo River	UT	1	5	19 3/	24	24
Salt Lake City Area	AZ	1	1,356	942	977	967
	CA	0	0	130	0	0
Integrated Projects	CO	5	288	1,827	2,032	2,014
	NE	0	0	0	612	606
	NV	0	0	768	165	164
	NM	1	24	921	1,496	1,462
	UT	1	132	1,354	1,987	1,968
	TX	0	0	0	0	0
	WY	1	13	598	0	0
Subtotal		9	1,813	6,540 4/	7,269	7,181

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POWER MARKETED AND WHEELED FOR OTHERS BY PROJECT (Continued)

Project	State	No. of Plants	Maximum Operating Capability-MW	FY 1989 Actual Power-GWh	FY 1990 Estimated Power-GWh	FY 1991 Estimated Power-GWh
Power Marketed (continued)						
Washoe	CA	1	3	7	8	8
Subtotal, Power Marketed		51	10,407	35,397	38,692	38,171
Power Wheeled for Others						
Central Valley	-	-	-	472	522	588
Loveland Area Projects	-	-	-	2,802	2,798	2,798
Pacific Northwest-Southwest Intertie	-	-	-	2,025	2,025	2,025
Parker-Davis	-	-	-	6,016	6,016	6,016
Pick-Sloan Missouri Basin Program-Eastern Division	-	-	-	2,452	2,452	2,452
Subtotal, Power Wheeled for Others	-	-	-	13,767	13,813	13,879

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POWER MARKETED AND WHEELED FOR OTHERS BY PROJECT (Continued)

Project	State	No. of Plants	Maximum Operating Capability-MW	FY 1989 Actual Power-GWh	FY 1990 Estimated Power-GWh	FY 1991 Estimated Power-GWh
Summary						
Power Marketed and Wheeled for Others						
Boulder Canyon		1	1,913	4,166	5,717	5,574
Central Valley		10	2,006	9,745	9,946	10,022
Colorado River Basin		1	547	2,604	1,905	1,636
Falcon-Amistad		2	98	290	313	313
Loveland Area Projects		16	876	4,642	4,724	4,724
Pacific Northwest-Southwest Intertie		0	0	2,025	2,025	2,025
Parker-Davis		2	338	7,298	7,559	7,512
Pick-Sloan Missouri Basin-Eastern Division		8	2,808	11,869	13,015	13,031
Provo River		1	5	19 1/	24	24
Salt Lake City Area Integrated Projects		9	1,813	6,540 2/	7,269	7,181
Washoe		1	3	8	8	8
Total, Power Marketed and Wheeled for Others		51	10,407	49,164	52,505	52,050

1/ As of September 30, 1989.

2/ Hoover Powerplant is located on the Arizona and Nevada border.

3/ The 19 GWh of Provo River Project Sales sold and marketed thru Salt Lake City Area Integrated Projects (SLCAIP) are also accounted for in SLCAIP.

4/ In FY 1989 there are 22 GWh of SLCAIP sales sold and marketed by Parker-Davis Project. The sales are also accounted for in Parker-Davis Project.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
(dollars in thousands)

ESTIMATE OF PROPRIETARY RECEIPTS

EXCLUDES REPAYMENT REFORM

Activity	Fiscal Years 1989	1990	1991	1992	1993	1994	1995
Sale and Transmission of Electric Energy - Falcon Dam, 2245	$ 112	$ 36	$ 32	$ 50	$ 25	$ 42	$ 47
Sale of Power and Other Utilities Not Otherwise Classified, 2249	29,215	29,215	29,215	29,215	29,215	29,215	29,215
Sale of Power - Western Area Power Administration - Reclamation Fund, 5000.27	192,959	258,519	287,851	300,933	299,895	285,143	296,565
Other - Reclamation Fund, 5000.28	4,422	2,000	2,000	2,000	2,000	2,000	2,000
Total Proprietary Receipts	$226,708	$289,770	$319,098	$332,198	$331,135	$316,400	$327,827

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
(dollars in thousands)

ESTIMATE OF PROPRIETARY RECEIPTS

INCLUDES REPAYMENT REFORM 1/

Activity	Fiscal Years 1989	1990	1991	1992	1993	1994	1995
Sale and Transmission of Electric Energy - Falcon Dam, 2245	$ 112	$ 36	$ 32	$ 50	$ 25	$ 42	$ 47
Sale of Power and Other Utilities Not Otherwise Classified, 2249	29,215	29,215	29,215	29,215	29,215	29,215	29,215
Sale of Power - Western Area Power Administration - Reclamation Fund, 5000.27	192,959	258,519	430,121	447,891	459,904	436,654	445,792
Other - Reclamation Fund, 5000.28	4,422	2,000	2,000	2,000	2,000	2,000	2,000
Total Proprietary Receipts	$226,708	$289,770	$461,368	$479,156	$491,135	$467,911	$477,054

1/ Receipt estimates increase beginning in FY 1991 to reflect proposed legislation to place power repayment practices on a more business-like basis that provides straight-line amortization of the Federal investment with interest on the unpaid balances accruing at current market rates. Additional receipts will also be deposited in the State Department Miscellaneous Receipt Account, 19-3220.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET
(dollars in thousands)

Central Valley Power System

	Estimated Total	Cumulative Prior Years	FY 1990 Estimate		FY 1991 Estimate		Remaining Balance
	obs	obs	obs	BO	obs	BO	obs
Operating Expenses (DOE):							
Design and Construction	$226,157	$41,285	$ 3,990	$ 2,100	$15,073	$13,566	$165,809
Total DOE obs/BO	$226,157	$41,285	$ 3,990	$ 2,100	$15,073	$13,566	$165,809
Non-DOE obs/BO							
Design and Construction	$ 12,284	$ 9,327	$ 1,740	$ 1,740	$ 1,217	$ 1,217	$ 0
Total Obligations/Outlays	$238,441	$50,612	$ 5,730	$ 3,840	$16,290	$14,783	$165,809
Method of Financing:							
Appropriations Available and Required			$ 3,990		$15,073		$165,809
Application of Planned Prior Year Funds			$ ---		$ ---		$ ---
Non-Federal Advances and Federal Reimbursements			$ 1,740		$ 1,217		$ ---

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET - 2

Central Valley Power System (continued)

Description, Objective, and Justification

The Central Valley Power System consists of over 1,300 circuit miles of 69- to 500-kV transmission lines which interconnect 10 powerplants, 1 pumping plant, and 12 major substations in northern and central California. Western markets electric power to preference wholesale customers and others, and administers a sales, transmission, and interchange contract with the Pacific Gas and Electric Company, the major private power utility in the area.

The objective of the program is to provide Western's customers with reliable electric power by increasing transmission system dependability.

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Transmission Lines and Terminal Facilities:			
Roseville-Elverta No. 2 230-kV Transmission Line	2nd Qtr 1991	2nd Qtr 1992	$1,520,000
- Construction work will begin on 12.5-miles of double circuit towers for the Roseville-Elverta No. 2 230-kV Transmission Line. The work is jointly financed with the City of Roseville, California, (a Western customer) and will enhance reliability of power deliveries to the city.			
Tracy-Banks 230-kV Transmission Line	1st Qtr 1990	4th Qtr 1991	$ 945,000
- Construction will be completed on the 2-mile Tracy-Banks 230-kV Transmission Line and terminal facilities.			

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET - 3

Central Valley Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Cottonwood-Elverta No. 3 230-kV Transmission Line	1st Qtr 1991	1st Qtr 1992	$6,240,000
- Work will begin on reconductoring the remaining 60 miles of the 130-mile Cottonwood-Elverta No. 3 230-kV Transmission Line. This is a second phase of a reconductoring and uprating plan. Initial rehabilitation was started in FY 1980 and completed in FY 1983.			
- Western will perform various miscellaneous transmission line work.	Continuing		$ 65,000
Substations:			
Folsom Substation, Stage 03	1st Qtr 1991	4th Qtr 1992	$1,785,000
- Construction will continue to relocate the Orangevale-Lake Substation 230-kV Transmission Line into Folsom Substation, Stage 03, to improve reliability of energy deliveries from Folsom powerplant.			
Tracy Substation, Stage 03	3rd Qtr 1992	2nd Qtr 1994	$1,800,000
- Engineering studies and design work will begin for Tracy Substation, Stage 03. Modification at the substation are expected to include replacement of 230-kV buswork, circuit breakers, and transformers in order to increase station reliability and improve effectiveness of maintenance operations. Much of the equipment was installed in the 1940's and is nearing the end of its service life.			

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET - 4

Central Valley Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Other Facilities:			
- A land transfer from the Bureau of Reclamation (BuRec) to Western will provide additional expansion space for future projects at the Tracy Substation (California) yard and will permit Western and BuRec to separate their respective power and water O&M management activities for more effective operations. In exchange for the land transfer, Western will finance modifications of existing BuRec maintenance facilities through payments to BuRec.	1991	1993	$ 500,000
- Work will be started on control buildings at New Melones Substation Stage 02 and at Shasta Switchyard to house electrical control equipment currently installed at the New Melones and Shasta Powerplants. The building will house relay and control panels, supervisory control and data acquisition equipment, and other protective equipment. Direct access will be provided for Western's operation and control of the power system in this area, improve reliability, and eliminate current expenses of BuRec personnel now required to operate Western's switchyard.	1st Qtr 1991	4th Qtr 1991	$ 1,238,000

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Central Valley Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
- Work is proposed to begin on the Sacramento Area microwave system addition in California. There are two parts of the system addition. The first part is a microwave communication system south of Tracy. This communication system will provide circuits for critical operation functions such as control and data acquisition, voice, disturbance information, revenue metering data, and mobile radio interconnections. The requirement for this addition is due to additional Western facilities in the area, remote revenue meter reading, and need for mobile communications for the safety of personnel working in the area. The second part is the addition of a repeater site in the northern microwave communication system (Sacramento to Keswick Substation). This communication system provides circuits for critical operational functions such as control and data acquisition, voice, and disturbance data. The additional repeater is needed because of excessive path length (90+ miles) between the South Fork and Grapevine sites. This excessive path length results in loss of the microwave signal during some atmospheric conditions about 1-2 times per month with no operations possible during that time.	1991	1993	$ 900,000
- Western will continue the purchase and installation of minor system additions and will continue preconstruction activities for minor modifications to substantially completed facilities.	Continuing		$ 80,000
		Total	$15,073,000

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Central Valley Power System (continued)

B. Management and Contracting

- Design and other preconstruction work will be performed by Western staff and contractors as required. Construction will be performed by contractor effort.

C. Prior Year Achievements

- Completed construction of interconnection transmission facilities for the City of Roseville and the City of Redding, California. The two cities financed the construction under cosponsored work agreements. Initiated construction on the Lawrence Livermore-Tracy 230-kV Transmission Line.

D. Current Year Planned Achievement

- Continue activities on system improvements. Design work will be performed on the Roseville-Elverta No. 2 230-kV Transmission Line. Folsom Substation Stage 03 work will be initiated.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET
(dollars in thousands)

Parker-Davis Power System

	Estimated Total	Cumulative Prior Years	FY 1990 Estimate		FY 1991 Estimate		Remaining Balance
	obs	obs	obs	BO	obs	BO	obs
Operating Expenses (DOE):							
Design and Construction	$152,009	$57,782	$ 22,601	$ 20,201	$19,950	$17,355	$51,676
Total DOE obs/BO	$152,009	$57,782	$ 22,601	$ 20,201	$19,950	$17,355	$51,676
Non-DOE obs/BO							
Design and Construction	$ 36,348	$21,502	$ 5,927	$ 5,927	$ 4,869	$ 4,869	$ 4,050
Total Obligations/Outlays	$188,357	$79,284	$ 28,528	$ 26,128	$24,819	$22,224	$55,726
Method of Financing:							
Appropriations Available and Required			$22,601		$19,950		$51,676
Application of Planned Prior Year Funds			---		---		---
Non-Federal Advances and Federal Reimbursements			$ 5,927		$ 4,869		$ 4,050

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Parker-Davis Power System (continued)

Description, Objectives, and Justification

The Parker-Davis Power System contains over 1,600 miles of transmission lines and over 2,000,000 kVA of installed capacity at substations in Arizona, California, and Nevada. The facilities are constructed to transmit power generated by the Bureau of Reclamation (BuRec) hydroelectric plants at Davis Dam and Parker Dam to various preference customers load centers.

The construction activities funded by this program consist of additions and modifications to the existing transmission system to increase system dependability and to provide reliable electric service to Western's customers.

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Transmission Lines and Terminal Facilities:			
Liberty-Parker No. 2 230-kV Transmission Line	1st Qtr 1988	2nd Qtr 1991	$ 160,000
- Minor work is scheduled for Parker Substation Stage 05. All other work is completed.			
Liberty-Phoenix 230-kV Transmission Line	4th Qtr 1990	2nd Qtr 1992	$1,631,000
- Work will be essentially complete on the Liberty-Phoenix 230-kV Transmission Line. Work in FY 1991 is scheduled primarily at Liberty and Phoenix Substations.			

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Parker-Davis Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Transmission Lines and Terminal Facilities (continued)	Continuing		$1,706,000
- Western will perform various planning activities on power facilities including studies for service to the DOE's Nevada Test Site and portions of the proposed Northern Arizona transmission system. Reimbursable work is expected to be nearly complete on facilities constructed for the BuRec's Central Arizona Project, including the Del Bac Substation and the Black Mountain-Del Bac 115-kV Transmission Line. Reimbursable work will also complete on BuRec's New Waddell-Westwing 230-kV Transmission Line and terminal facilities.			
Substations:			
Basic Substation, Stage 03	4th Qtr 1991	4th Qtr 1993	$4,598,000
- Equipment acquisition will begin on Basic Substation Stage 03 in Nevada in order to improve safety and reliability, decrease transformer exposure to faults, and reduce operation and maintenance costs. The three substation yards at Basic will be replaced with one new substation.			

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DEPARTMENT OF ENERGY
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POWER SYSTEM DATA SHEET - 4

Parker-Davis Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Substations (continued)			
- Western will continue the purchase and installation of miscellaneous substation equipment. Construction will be initiated on Coolidge Substation, Stage 07, and Davis Switchyard, Stage 04, which will improve reliability and maintainability and make interconnections with other electric utilities in Arizona more feasible. Also, work will continue for the replacement of a 230/69-kV transformer and equipment at Mesa Substation in Arizona.	Continuing		$ 4,619,000
Other Facilities:			
Phoenix Operation and Maintenance Center Modification	4th Qtr 1990	3rd Qtr 1993	$ 7,236,000
- Construction will essentially be completed on Stage 1 (replacement of the dispatch center). Construction of Stage 2 (maintenance and administrative facilities) will begin during FY 1991.			
	Total		$19,950,000

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WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET - 5

Parker-Davis Power System (continued)

B. Management and Contracting

- Design and other preconstruction work will be performed by Western staff and contractors as required. Construction will be performed by contractor effort.

C. Prior Year Achievements

- Construction continued on the Liberty-Parker No. 2 230-kV Transmission Line and terminal facilities (Arizona). Purchased new transformers and awarded construction contract for Coolidge 06.

D. Current Year Planned Achievements

- Construction work, in progress from the previous year, will continue. Contracts will be awarded for the Phoenix O&M Center modification, Stage 1.

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DEPARTMENT OF ENERGY
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WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET
(dollars in thousands)

Pacific Northwest-Pacific Southwest Intertie

	Estimated Total	Cumulative Prior Years	FY 1990 Estimate		FY 1991 Estimate		Remaining Balance
	obs	obs	obs	BO	obs	BO	obs
Operating Expenses (DOE): Design and Construction	$205,076	$11,300	$ 2,919	$ 2,919	$ 25,764	$ 17,096	$165,093
Total DOE obs/BO	$205,076	$11,300	$ 2,919	$ 2,919	$ 25,764	$ 17,096	$165,093
Non-DOE obs/BO Design and Construction	$270,281	$ 8,583	$ 86,005	$ 86,005	$106,013	$106,013	$ 69,680
Total Obligations/Outlays	$475,357	$19,883	$ 88,924	$ 88,924	$131,777	$123,109	$234,773
Method of Financing:							
Appropriations Available and Required			$ 2,919		$ 25,764		$165,093
Application of Planned Prior Year Funds			$ ---		$ ---		$ ---
Non-Federal Advances and Federal Reimbursements			$ 86,005		$106,013		$ 69,680

Pacific Northwest-Pacific Southwest Intertie (continued)

Description, Objective, and Justification

This project, located in Arizona, Nevada, California, and the Pacific Northwest consists of the extra high-voltage Pacific Northwest-Pacific Southwest Intertie which is assigned to Western. In conjunction with Bonneville Power Administration's portion of the Intertie, these facilities would permit the sale of power from the Northwest to California, Arizona, and Nevada, together with the seasonal exchange of capacity between the Pacific Southwest and the Pacific Northwest.

The plan is designed to integrate the Federal hydroelectric projects in the Northwest, in northern California, and in the Colorado River area. The investment in construction facilities would be repaid with interest within 50 years from the time the lines become revenue producing. Funds to initiate construction of Intertie facilities were originally appropriated in FY 1965. The 800-kV DC line from Oregon to California and the 500-kV AC lines and the first 345-kV AC line from southern Nevada to the Phoenix area were completed and in operation by 1970. Public Law 88-552 also authorized a 750-kV DC line from Dalles, Oregon, to Hoover Dam in southern Nevada connecting to Los Angeles by a 750-kV DC line, and a second 345-kV AC line connecting the Hoover terminal to the Phoenix, Arizona, area.

Statements were presented to Congress in budget proceedings in 1977 and subsequently which disclosed technical revisions to the Intertie project to meet changing technological, environmental, and economic (load and resource) conditions. It was then proposed to increase the voltage to ±500-kV DC and to construct the line from Dalles, Oregon, to Mead Substation near Hoover Dam in Nevada and from Mead Substation to Phoenix, Arizona, area. Funds were appropriated to support the continued development of the project.

Pacific Northwest-Pacific Southwest Intertie (continued)

Description, Objective, and Justification (continued)

On March 15, 1989, Salt River Project (SRP) along with the Los Angeles Department of Water and Power (LADWP) presented a new proposal for the Intertie Project's Phase I and Phase II. The proposal for Phase I is to construct a 500-kV AC line from southern Nevada to the Phoenix Area and to uprate Western's Mead-Liberty 345-kV AC line to accommodate an additional 300 MW, for a total of 1300 MW. Phase II will be a 500-kV AC line from southern Nevada to southern California (Adelanto Substation near Victorville, CA). The changes in the project are due to revised estimates (downward) by the parties for capacity in the proposed lines. The line between southern Nevada and Phoenix will be convertible to 500-kV DC at some time in the future.

With present generation and load patterns, the existing transmission system does not have the capacity needed to meet Western's Boulder City Area customers' requests for transmission service. Western will work with non-Federal power utility interests to develop and build an approximately 243-mile line from Mead Substation to the Phoenix, Arizona, area.

Southern and central California interests, Salt River Project (SRP), and Western have negotiated contractual arrangements whereby the construction of Phase I (Mead to Phoenix) of the Pacific Northwest-Pacific Southwest Intertie can go forward with an in-service date of 1993. SRP, located in Phoenix, Arizona, will develop and construct the Mead-Phoenix AC line, and SRP and Western will operate the line when it goes into service. The southern California interests, who have consolidated their efforts under an umbrella corporate body (Southern California Public Power Authority) and MSR Public Power Agency, will finance the cost of building the project to the initial 1,300 MW level. Western will own the right-of-way for the Mead to Phoenix alignment and will secure rights to approximately 20 percent of the initial 1,300 MW project capability for use by Western. Western has assisted in the development of Phase I by performing the environmental clearance and other activities.

The Phase I project participants have also signed agreements to proceed with all necessary planning work on Phase II, the Mead-Adelanto portion of the Intertie project. The LADWP is the project manager for the preconstruction stage of the project work. The Mead-Adelanto line is presently planned to be 1,600 MW and will connect to the Mead-Phoenix project.

Pacific Northwest-Pacific Southwest Intertie (continued)

Description, Objective, and Justification (continued)

Western executed negotiated agreements with Pacific Northwest and Southwest utility interests that provide for planning and technical studies on Phase III, a line from Western's Mead Substation and an as yet undefined location in the Northwest. The joint participation project will be funded largely by non-Federal utilities with Western expected to own rights to about 15 percent of the line capacity. The project is expected to commit to construction in 1997 with an estimated in-service date of 2000.

Western is not a majority participant nor project manager of any of the three phases of the project, and therefore has limited control of major project decisions, such as the construction start schedule and the eventual in-service date, the capacity ratings of the project elements, and the cost of the overall project. The construction start schedules have been adjusted periodically in prior years and are expected to change in the future, typical of projects of this nature. Appropriate adjustments in Western's budgetary reporting should be expected in order to track the project schedules being reported by the project managers.

Recently there has been a significant drop in the total estimated cost due to changing from DC transmission lines to AC transmission lines for the Mead-Phoenix Intertie and Mead-Adelanto Intertie.

Benefits: Long-term benefits are outlined below:

1. Exchanges of summer-winter surplus peaking capacity between the Northwest and Southwest to reduce capital expenditures for new generating capacity.

2. Sale of surplus Northwest and Canadian secondary energy to Southwest utilities.

3. Sale of Southwest energy to the Northwest to firm up peaking hydro sources during critical water shortage years in the Northwest.

4. Use of Northwest energy to provide firming energy for Southwest hydro systems.

Pacific Northwest-Pacific Southwest Intertie (continued)

Description, Objective, and Justification (continued)

Benefits: (continued)

5. Energy-related benefits associated with exchange of seasonal peaking capacity.

6. Additional system support provided to both the Pacific Northwest and Pacific Southwest systems.

7. Utilization of daily diversity between the Pacific Northwest and Pacific Southwest during portions of the season.

8. Additional transmission capacity from Arizona to California to allow California entities to obtain coal and nuclear energy to replace oil-fired energy.

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Transmission Lines and Terminal Facilities:			
California-Oregon Transmission Project		Continuing	--

- Public Law 98-360 authorized the Secretary of Energy to construct or participate in the construction of a third 500-kV line between the Pacific Northwest and California. Private and public utilities in California have developed a plan of service for the COTP to construct (or upgrade) and operate about 346 miles of 500-kV AC transmission line, three substations, a series compensation station, and communication and other

Pacific Northwest-Pacific Southwest Intertie (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Transmission Lines and Terminal Facilities (continued)			
California-Oregon Transmission Project (continued)			

supporting facilities, from the California-Oregon border to Central California. A key segment is upgrading Western's existing 170-mile Shasta-Tracy 230-kV transmission line to 500 kV. Western will also construct substation facilities near Redding, California, at Tracy Substation, California, and a series compensation station midway between Tracy and Redding. These facilities are necessary to accommodate the increased capacity of the upgraded intertie system. The COTP will provide a cost-effective means of increasing intertie reliability and will allow a greater transfer of low-cost surplus generation from the Northwest to displace more expensive nonrenewable energy in California. When placed in service, there will be a reduction of power costs to consumers in both regions, and a means will be provided to enhance exchanges of surplus firm energy and economy energy among the utilities of the west. The total estimated cost of the COTP is $453 million, which includes $264 million for Western's portion. Estimates reflect the latest Project Manager's total cost, including escalation and interest during construction. However, due to delays

Pacific Northwest-Pacific Southwest Intertie (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Transmission Lines and Terminal Facilities (continued)			
California-Oregon Transmission Project (continued)			
in the project, Western is continuing with acquisition of the necessary rights-of-way and material acquisition for relocating existing lines in advance of substation construction. Funds for this work will be reimbursed by the participants. The COTP will be financed by non-Federal participants.			
Mead-Adelanto Intertie	1991	1994	$12,449,000
- Western is expected to begin participation in equipment acquisition and land and rights activity for the Mead-Adelanto Intertie. Western is a minority participant with other utilities. Requested funds will primarily be paid to a non-Federal construction project manager (the City of Los Angeles Department of Water and Power).			

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Pacific Northwest-Pacific Southwest Intertie (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Transmission Lines and Terminal Facilities (continued)		Continuing	$2,372,000
- Western, as a joint participant with the Salt River Project, the Southern California Public Power Authority, and others, will continue planning studies, design activity, and land and rights activities for the Mead-Phoenix AC Transmission Line (Nevada-Arizona). Western will also continue its participation in planning studies and land and rights activities on the Mead-Northwest Intertie and the Mead-Liberty 345-kV upgrade.			
Substations:			
Malin Substation	1990	1992	$7,803,000
- Western proposes to replace series capacitors at Malin Substation in southern Oregon. The capacitors are reaching the end of their service life and contain insulating oils containing polychlorinated biphenyls (PCB).			
- Minor work on substation improvements will continue including studies for replacement and upgrade of equipment at Mead Substation Stage 07 (Nevada).		Continuing	$ 98,000

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Pacific Northwest-Pacific Southwest Intertie (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Other			
- Construction activities will be completed for a warehouse and maintenance building at the Mead Operation and Maintenance Complex in Nevada in order to improve operations and alleviate crowded conditions.	4th Qtr 1990	4th Qtr 1991	$3,042,000
		Total	$25,764,000

B. Management and Contracting

- Planning and land acquisition activities will be performed by Western staff and outside contractors. Construction will be performed by contractor effort.

C. Prior Year Achievement

- Planning studies continued for the interties between the Pacific Northwest and Pacific Southwest.

D. Current Year Planned Achievements

- Western will continue planning activities and land and rights activities in coordination with other participants in the various intertie projects.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET
(dollars in thousands)

Pick-Sloan Missouri Basin Power System

	Estimated Total	Cumulative Prior Years	FY 1990 Estimate		FY 1991 Estimate		Remaining Balance
	obs	obs	obs	BO	obs	BO	obs
Operating Expenses (DOE):							
Design and Construction	$572,496	$281,273	$ 50,607	$ 45,546	$ 30,483	$24,285	$210,133
Total DOE obs/BO	$572,496	$281,273	$ 50,607	$ 45,546	$ 30,483	$24,285	$210,133
Non-DOE obs/BO							
Design and Construction	$ 61,441	$ 29,319	$ 3,947	$ 3,947	$ 6,252	$ 6,252	$ 21,923
Total Obligations/Outlays	$633,937	$310,592	$ 54,554	$ 49,493	$ 36,735	$30,537	$232,056
Method of Financing:							
Appropriations Available and Required			$ 50,607		$ 30,483		$210,133
Application of Planned Prior Year Funds			$ ---		$ ---		$ ---
Non-Federal Advances and Federal Reimbursements			$ 3,947		$ 6,252		$ 21,923

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET - 2

Pick-Sloan Missouri Basin Power System (continued)

Description, Objective, and Justification

The transmission facilities of the Pick-Sloan Missouri Basin Program interconnect Federal hydroelectric powerplants in Western's operational area and deliver power for irrigation pumping and sales to municipalities, cooperatives, private utilities, and state and Federal customers. Transmission facilities of the Fort Peck Project in Montana are also integrated with facilities of the Pick-Sloan Missouri Basin Power System. This major power marketing system is operated by two Western Area Offices: the Loveland Area Office for portions of this program in Wyoming, Colorado, Kansas, and western Nebraska; and the Billings Area Office for portions within North Dakota, South Dakota, Iowa, Minnesota, Missouri, Montana, and eastern Nebraska. Western will continue to upgrade existing transmission facilities to increase system dependability and to assure reliable electric service for Western's customers.

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Transmission Lines and Terminal Facilities:			
Jamestown-Grand Forks 230-kV Transmission Line	4th Qtr 1988	1st Qtr 1991	$ 264,000

- Western will complete construction work to upgrade the existing Jamestown-Grand Forks 115-kV Transmission Line in North Dakota to 230 kV and make modifications at Jamestown and Grand Forks Substations. The total estimated cost is $14.5 million.

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DEPARTMENT OF ENERGY
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WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET - 3

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Transmission Lines and Terminal Facilities (continued)			
Charlie Creek-Belfield 345-kV Transmission Line	2nd Qtr 1990	2nd Qtr 1991	$2,006,000
- Construction will be completed on the 35-mile-long Charlie Creek-Belfield 345-kV Transmission Line and terminal facilities in western North Dakota.			
Lovell-North Cody-Big George 115-kV Transmission Line	4th Qtr 1989	4th Qtr 1991	$1,993,000
- Western will complete the upgrade of the Lovell-North Cody-Big George 115-kV Transmission Line in northern Wyoming. The existing structures and conductors are being replaced.			
Miracle Mile transmission consolidation project (formerly referred to as the Seminoe-Kortes transmission consolidation project)	3rd Qtr 1990	2nd Qtr 1992	$ 483,000
- Construction will continue on the Miracle Mile Substation, Seminoe Substation, and Kortes Substation in Wyoming and modifications to several 115-kV lines. Miracle Mile Substation will consolidate the equipment required to serve the Seminoe and Kortes powerplants into a single substation.			

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DEPARTMENT OF ENERGY
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WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET - 4

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Transmission Lines and Terminal Facilities (continued)			
Limestone-Gering-Bayard-McGrew 34.5/69-kV Transmission Line	3rd Qtr 1990	4th Qtr 1993	$ 895,000
- Construction work will continue on removing 125 miles of 34.5-kV line between Limestone Substation in Wyoming and the City of Bayard, Nebraska. This line will be replaced with a 69-kV line that will be initially operated at 34.5 kV. In addition to replacing the existing line, Western will extend the line 27 miles from Bayard Tap to McGrew Substation in Nebraska to provide a loop feed for the City of Bayard and for the rural loads. The project will be constructed in stages over three to four years beginning in FY 1990.			
Sidney-North Yuma 230-kV Transmission Line	1st Qtr 1991	4th Qtr 1992	$5,070,000
- Construction work will begin on the Sidney-North Yuma 230-kV Transmission Line and terminal facilities in Nebraska and Colorado. Western is a 55 percent participant in the project, joined by Tri-State Generation and Transmission Association, Inc., (Tri-State) and Public Service Company of Colorado.			

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DEPARTMENT OF ENERGY
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WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET - 5

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Transmission Lines and Terminal Facilities (continued)			
Sidney-North Yuma 230-kV Transmission Line (continued)			

This project consists of constructing approximately 80 miles of new 230-kV transmission line from Sidney Substation to North Yuma Substation, installing termination facilities at Sidney and North Yuma Substations, and adding a single bank 24-MVAR reactor on the tertiary (low voltage) side of the North Yuma transformer. Sidney and North Yuma Substations are owned by Tri-State.

Western requires additional transmission capacity from the proposed Sidney-North Yuma 230-kV Line to provide adequate energy import capability to eastern Colorado to serve Federal loads. Western currently services Federal loads from the 115-kV system in eastern Colorado. The load-serving capability of the 115-kV system is presently limited and not adequate to cover Federal and non-Federal loads. The construction of the Sidney-North Yuma line would increase the load-serving capability of the 115-kV system to a level adequate to serve both present and future Western loads. The existing transmission system is not adequate to support the full capacity of the Sidney (Nebraska) DC Tie. Construction of the proposed Sidney-North Yuma Line would eliminate the need to reduce power flow across the DC Tie during a Sidney-Stegall line outage and will allow the transmission system between Wyoming and Colorado to be more fully used.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET - 6

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Transmission Lines and Terminal Facilities (continued)			
Kansas Transmission Project	1991	1993	$ 1,072,000
- In FY 1989, Western entered into a Memorandum of Intent with Sunflower Electric Cooperative, Inc., of Hays, Kansas, and Golden Spread Electric Cooperative, Inc., of Amarillo, Texas. The parties propose to construct new 345-kV transmission facilities and substation improvements in southwest Kansas. In return for Western's participation, Sunflower will make available to Western the transmission capacity needed to serve 18 of Western's customers, beginning October 1, 1989, who are connected to Sunflower's transmission system. These customers estimate that they will save $25 million over the life of the 15-year contracts. Thirty-nine Kansas cities have allocations of power, but lack of transmission access currently prevents the other 21 cities from purchasing low-cost energy from Western.			
Flatiron-Erie 115-kV Transmission Line	3rd Qtr 1991	4th Qtr 1992	$ 534,000
- Work will begin on raising the existing Flatiron-Erie 115-kV Transmission Line in Colorado by modifying approximately 50 line structures. These modifications will increase the maximum capability of the line from 66 MVA to 109 MVA in order to avoid loss of service to customers in the Longmont, Colorado, area.			

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Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Transmission Lines and Terminal Facilities (continued)			
- Western will perform engineering studies and other preconstruction activities for Fort Peck-Wolf Point 230-kV Transmission Line (Montana); Estes-Flatiron 115-kV Transmission Line (Colorado); Carter Mountain-Thermopolis 115-kV Transmission Line (Wyoming); the Holcomb-Guymon 230-kV Transmission Line (Kansas); Ault-Gunbarrel 115/230-kV Transmission Line; Big George-Carter Mountain 69/115-kV Transmission Line (Colorado); and the Blue River-Summit 115-kV Transmission Line (Colorado).		Continuing	$ 3,339,000
Construction will be completed on the Kremmling-Windy Gap 230-kV Transmission Line (Colorado).			
Activities will begin on the Casper (Wyoming) Area transmission line modifications which involve primarily the removal of several 69-kV and 115-kV sections of line as part of a plan to solve encroachment problems, maintenance and operational difficulties, and Bureau of Land Management visual impact concerns.			

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET - B

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Substations:			
Watertown Substation Static Var Compensator Addition	4th Qtr 1991	4th Qtr 1993	$ 404,000
- Construction will continue on the Static Var Compensator at Watertown Substation in South Dakota. The Static Var Compensator addition ensures that Western's customers in the Watertown area will continue to be reliably served. It will also improve voltage control performance.			
Wolf Point Substation Stage 02	2nd Qtr 1991	4th Qtr 1992	$ 2,581,000
- Construction is proposed to begin on Wolf Point Substation Stage 02 additions in northern Montana. The Wolf Point Substation is an important switching station for the power output from Fort Peck generation to loads at Poplar, Culbertson, Williston, Circle, and Dawson County. A complete upgrade of substation facilities at Wolf Point is needed to facilitate transmission improvements for the area. The existing facilities do not allow for versatility of operation, ease of maintenance, reliability to area loads, or consideration of expansion plans for new interties or future load growth. The proposed additions include expansion or			

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Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Substations (continued)			
Wolf Point Substation Additions (continued)			
possible relocation of the existing substation yard, installation of six 115-kV circuit breakers, associated buswork, disconnect switches, metering equipment, and control boards to improve the reliability of service at Wolf Point Substation. Stage 02 additions also include replacement of the existing 9.375-MVA transformer with a 15-MVA unit and a new service building. The proposed project will improve reliability of service at Wolf Point Substation with the provisions for automatic fault isolation, improved line switching, supervisory control and data acquisition, and improved system protection. The proposed project will also accommodate proposed future expansion of the area transmission system. One 115-kV breaker bay will be constructed at the expense of the Northern Electric Cooperative.			
Jamestown Substation Stage 11	1991	1993	$2,169,000
- Equipment acquisition is expected to begin at Jamestown Substation (North Dakota) for breaker replacements and a 115-kV 30-MVAR reactor.			

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DEPARTMENT OF ENERGY
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POWER SYSTEM DATA SHEET - 10

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Substations (continued)			
Copper Mountain Substation Stage 01	2nd Qtr 1991	4th Qtr 1992	$ 463,000
- Western proposes to begin construction activities for Copper Mountain Substation Stage 01 in Wyoming. The substation will serve the 34.5-kV loads currently being served from Boysen Substation. The 34.5-kV loads, including the town of Shoshoni, will have a more reliable power source from the new substation than from obsolete, temporary equipment at Boysen Substation. The 34.5-kV equipment at Boysen Substation is being removed due to maintenance, safety, and environmental problems. The total estimated cost of the Copper Mountain Substation is $1.6 million.			
Flatiron Substation Stage 02	2nd Qtr 1991	3rd Qtr 1992	$ 358,000
- Construction is proposed to begin for Flatiron Substation Stage 02 additions in Colorado. The work will enlarge the substation yard to provide a new control building, replace four 115-kV breakers, add a unit substation for station service, and relocate all control and communication equipment from the Flatiron Powerplant and the Loveland Control Center to the new control building. The powerplant and control building are operated by the BuRec; this work will allow separation of Western equipment from BuRec equipment for increased reliability and improved access for maintenance personnel.			

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Substations (continued)			
Flatiron Substation Stage 02 (continued)			

The four 115-kV breakers are over 30 years old and need to be replaced to ensure reliability. The existing coupling capacitor voltage transformers on the Pole Hill and Hygiene 115-kV lines do not meet the National Electric Safety Code (NESC) ground clearance requirements, are difficult to tune and maintain, and make synchronization difficult because they are not located on the same phase on each line. The existing wrought iron bus rusts easily and must be painted on a regular basis, so replacing it with aluminum bus will reduce long-term maintenance costs and improve reliability. The existing protective relay, meter, control panels, and the supervisory control and data acquisition equipment are located in the powerplant control room and lower gallery. With the recent addition of automatic generation control equipment, there is limited space available in the control room and virtually no space remaining for expansion or easy access for maintenance. A new control building in the switchyard will provide the necessary room for the equipment and will provide Western's maintenance personnel with better access when performing maintenance.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET - 12

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Substations (continued)			
Fort Morgan West Substation	4th Qtr 1991	1st Qtr 1993	$ 416,000
- Work will begin on Stage 01 of the Fort Morgan West Substation (Colorado). The existing Fort Morgan Substation (built in 1941) will be relocated from a flood plain and rebuilt with three new 115-kV circuit breakers to meet the needs of Morgan County Rural Electric Association and the City of Fort Morgan, Colorado.			
- Western will continue or complete construction activities on Hoyt Substation 02 additions (Colorado); Kiowa Creek Switching Station 01 (Colorado); Bridgeport Substation 02 (Nebraska); and Boysen Substation 02 (Wyoming).	Continuing		$4,645,000
Western will also continue to purchase and install various systemwide additions such as autotransformers, power circuit breakers, sectionalizing switches, and protective relays for miscellaneous facilities. Preconstruction activities will be performed on Kimball Substation (Nebraska), and Round Top Substation (Wyoming). These substation additions are required to improve system reliability by providing more dependable protection equipment, reducing maintenance costs by replacing obsolete high-maintenance equipment, and increasing transmission system capacity.			

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET - 13

Pick-Sloan Missouri Basin Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Other Facilities:			
- Western will upgrade the existing SCADA system for the Billings (Montana) Area which controls power deliveries over a large, interconnected power system to Western's customers in the upper plains states. A programmable master supervisory control system and an energy control system is being replaced with state-of-the-art equipment for power system, control, reliability, and security.	1st Qtr 1990	1995	$ 2,570,000
- Western will continue to purchase and install miscellaneous system additions, such as microwave and telecommunications equipment for substantially completed facilities.	Continuing		$ 1,221,000
	Total		$30,483,000

1505

Pick-Sloan Missouri Basin Power System (continued)

B. Management and Contracting

- Design and other preconstruction work will be performed by Western staff and contractors as required. Construction will be performed by contractor effort.

C. Prior-Year Achievements

- Construction is scheduled to be completed on the Casper-Glenrock 230-kV Transmission Line (Wyoming) and the Conrad-Shelby 230-kV Transmission Line (Montana).

D. Current-Year Planned Achievements

- Construction will be underway on the Charlie Creek-Belfield 345-kV Transmission Line and terminal facilities in North Dakota and the Lovell-North Cody-Big George 115-kV Transmission Line in Wyoming. Construction will start on the Miracle Mile transmission consolidation project (Wyoming).

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET
(dollars in thousands)

Colorado River Storage Power System

	Estimated Total	Cumulative Prior Years	FY 1990 Estimate		FY 1991 Estimate		Remaining Balance
	obs	obs	obs	BO	obs	BO	obs
Operating Expenses (DOE): Design and Construction	$404,648	$ 94,490	$ 13,400	$ 12,060	$ 19,250	$ 20,281	$277,508
Total DOE obs/BO	$404,648	$ 94,490	$ 13,400	$ 12,060	$ 19,250	$ 20,281	$277,508
Non-DOE obs/BO Design and Construction	$157,044	$ 20,376	$ 5,166	$ 5,166	$ 3,387	$ 3,387	$128,115
Total Obligations/Outlays	$561,692	$114,866	$ 18,566	$ 17,226	$ 22,637	$ 23,668	$405,623
Method of Financing:							
Appropriations Available and Required			$ 13,400		$ 19,250		$277,508
Application of Planned Prior Year Funds			$ ---		$ ---		$ ---
Non-Federal Advances and Federal Reimbursements			$ 5,166		$ 3,387		$128,115

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
WESTERN AREA POWER ADMINISTRATION
POWER SYSTEM DATA SHEET - 2

Colorado River Storage Power System (continued)

Description, Objective, and Justification

The transmission facilities of the Colorado River Storage Project include transmission lines, substations, switchyards, and other facilities to provide for the interconnection of storage project powerplants, participating project power facilities, and other Federal projects' powerplants. Western's transmission facilities also interconnect with the electrical facilities of the major investor-owned power companies and other public power utilities in the Colorado River Basin area so that the greatest practicable amount of firm power and energy can be produced and delivered to the load centers for sale.

The objective of this project is to provide Western's customers with reliable electric power by increasing the transmission system's dependability, reducing inadvertent flows, and increasing transfer capability from areas of surplus generation to load growth areas.

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Transmission Lines and Terminal Facilities			
Meeker-Rangely 138-kV Transmission Line	4th Qtr 1991	1st Qtr 1993	$4,467,000

- Construction is proposed for a new 22-mile 138-kV transmission line between Rangely and Meeker Substations in northwest Colorado, and the construction of an 11-mile transmission line between California Substation and Deserado Substation. Two new line bays will be added at California Substation. The line will contribute to the overall reliability of Western's system by providing an additional parallel 138-kV path from Meeker to Rangely and enhance Western's transmission path between Colorado and Utah.

Colorado River Storage Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
Transmission Lines and Terminal Facilities (continued)			
- Preconstruction and land activities will be performed for various facilities, including the Northern Arizona transmission project (New Mexico-Arizona); Glen Canyon-Navajo 500-kV transmission project (Arizona); the Shiprock-Albuquerque 345-kV transmission project; Western Colorado 345-kV Additions, including the Curecanti-Montrose 345-kV Transmission Line and Curecanti Substation Stage 05 additions; the Utah transmission system; and the Animas-La Plata (Colorado) transmission system. Most of the work in the Northern Arizona and New Mexico area will help provide increased capacity, eliminate system transfer bottlenecks, and will be coordinated with the long-term power supply requirements of the Navajo Nation.	Continuing		$ 7,254,000
Substations			
- Construction work is proposed to begin on the Glen Canyon Substation Stage 05 in Arizona. The project will provide 138-kV service to Garkane Power Association, Inc. Garkane plans on uprating a portion of its transmission system from 69 kV to 138 kV. Temporary 138-kv service will be obtained in FY 1990 until a permanent transformer and associated equipment are acquired and installed.	3rd Qtr 1991	3rd Qtr 1992	$ 2,751,000

Colorado River Storage Power System (continued)

A. Planned Activities

Activity	Construction Start	Construction Stop	FY 1991 Estimate
- Western will continue the purchase and installation of minor equipment additions to existing facilities. Preconstruction activities will be performed for western Colorado capacitor banks, Glen Canyon Substation Stage 06 (to be financed by the city of Page, Arizona), and for Glen Canyon Substation Stage 07.		Continuing	$ 1,019,000
Other		Continuing	$ 3,759,000
- Western will continue the purchase and installation of minor equipment additions to existing facilities, including a spare transformer for the Salt Lake City Area. Minor work will be completed for acquisition and installation of equipment for the Salt Lake City Area microwave system.			
		Total	$19,250,000

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Colorado River Storage Power System (continued)

B. Management and Contracting

- Design and other preconstruction work will be performed by Western staff and outside contractors as required. Construction will be performed by contractor effort.

C. Prior-Year Achievements

- Completion of phase-shifting transformers installation at Shiprock and Waterflow Substations in New Mexico.

D. Current-Year Planned Achievements

- The Bears Ears-Bonanza 345-kV Transmission Line and terminal facilities are scheduled for completion in Colorado and Utah.

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DEPARTMENT OF ENERGY

FISCAL YEAR 1991 CONGRESSIONAL BUDGET REQUEST

DEPARTMENTAL ADMINISTRATION

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION

PROPOSED APPROPRIATION LANGUAGE

Departmental Administration

For salaries and expenses of the Department of Energy necessary for Departmental Administration and other activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the hire of passenger motor vehicles and official reception and representation expenses (not to exceed $35,000) [$355,056,000] $224,427,000, to remain available until expended [, plus such additional amounts as necessary to cover increases in the estimated amount of cost of work for others notwithstanding the provisions of the Anti-Deficiency Act (31 U.S.C. 1511 et seq.): Provided, That such increases in cost of work are offset by revenue increases of the same or greater amount, to remain available until expended: Provided further, That moneys received by the Department for miscellaneous revenues estimated to total $150,000,000 in fiscal year 1990 may be retained and used for operating expenses within this account, and may remain available until expended, as authorized by section 201 of Public Law 95-238, notwithstanding the provisions of section 3302 of title 31, United States Code: Provided further, That the sum herein appropriated shall be reduced by the amount of miscellaneous revenues received during fiscal year 1990 so as to result in a final fiscal year 1990 appropriation estimated at not more than $205,056,000]; and in addition, notwithstanding 31 U.S.C. 3302, not to exceed $183,413,000, to be derived from collections authorized by section 201 of Public Law 95-238, to be credited to this account and remain available until expended. (Energy and Water Development Appropriations Act, 1990.)

EXPLANATION OF CHANGE

Proposed appropriation language will allow the Department to incur obligations against revenues as they are received rather in advance of their receipt.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION

OVERVIEW

OFFICE OF THE SECRETARY

The Office of the Secretary formulates energy policies, implements regulations, and interprets legislation mandated by the President and enacted by Congress. The Office serves as a focal point for oversight of production, conservation, and development of alternative energy sources as well as ensuring compliance with United States energy policy and national security objectives.

Major program activities are explained in each decision unit submitted by the Departmental program elements.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(Dollars In Thousands)

LEAD TABLE

OFFICE OF THE SECRETARY

Activity	FY 1989	FY 1990[2/]	FY 1991 BASE	FY 1991 REQUEST	PROGRAM CHANGE REQUEST vs. BASE	
					DOLLAR	PERCENT
Operating Expenses	$2,706	$4,005	$4,005	$3,911	$-94	-2%
Use of unobligated balances	-502	-1,932	0	0	0	
Budget Authority	$2,204	$2,073	$4,005	$3,911	$-94	-2%
Staffing (FTEs)[1/]	37	53	53	53		

AUTHORIZATION: P.L. 95-91

1/ Reflects two (2) additional FTE's transferred from Congressional, Intergovernmental and Public Affairs (CP) in FY 1990 and FY 1991 for the Scheduling and Coordination of Public Appearances function (FY 1989 FTEs made comparable.)

2/ Reflects FY 1990 final Gramm-Rudman-Hollings sequester adjustments and P.L. 101-164 reductions to fund anti-drug activities.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(Dollars in Thousands)

SUMMARY OF CHANGES

OFFICE OF THE SECRETARY

FY 1990 Program Level	$4,005
Adjustments - Pay cost supplemental	$0
FY 1990 Base	$4,005
Repricing of salary expenses	$-104
Increased travel and training to carry out the Secretary's Department-wide initiative to address management issues and energy goals	$+10
FY 1991 Congressional Budget Request	$3,911

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

OFFICE OF THE SECRETARY

I. Preface

The Office of the Secretary formulates energy policies, implements regulations and interprets legislation mandated by the President and enacted by Congress. This Office serves as a focal point for ensuring that production, conservation and development of alternative energy sources adhere to United States energy policy and national objectives.

II. Summary Table

Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Personnel Compensation	$ 687	$1,823	$1,745	-4%
Other Compensation	1,458	1,429	1,411	-1%
Benefits	306	484	476	-2%
Travel	254	264	272	+3%
Support Services	1	5	7	+40%
Activity Totals	$2,706	$4,005	$3,911	-2%

III. ACTIVITY DESCRIPTION

NAME OF ACTIVITY	FY 1989	FY 1990	FY 1991
Personnel Compensation and Benefits	Funding for requested FTEs to ensure adequate direction and compensation are provided to Departmental programs and the Secretary's immediate office. ($2,451)	Funding for requested FTEs to ensure adequate direction and compensation are provided to Departmental programs and the Secretary's immediate office. ($3,736)	Funding for requested FTEs to ensure adequate direction and compensation are provided to Departmental programs and the Secretary's immediate office. ($3,632)
Travel	Provides an adequate level of funding for the Secretary to travel both internationally and domestically in support of National energy goals and Departmental program and management issues. ($254)	Continues an adequate level of funding for the Secretary to travel both internationally and domestically in support of National energy goals and Departmental program and management issues. ($264)	Provides an adequate level of funding for the Secretary to travel both internationally and domestically in support of National energy goals and the Secretary's Department-wide initiative to address management issues and energy goals. ($272)
Support Services	Provides funding for training. ($1)	Provides funding for training. ($5)	Provides funding for training. ($7)
Total, Office of the Secretary	$2,706	$4,005	$3,911

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(Obligations In Thousands of Dollars)

OBJECT CLASS SUMMARY

Office of the Secretary

	Direct Funding	FY 1989	FY 1990	FY 1991
11.1	Full-Time Permanent	$ 687	$1,823	$1,745
11.3	Other Than Full-Time Permanent	1,347	1,309	1,292
11.5	Other Personnel Compensation	111	120	119
11.9	Total Personnel Compensation	$2,145	$3,252	$3,156
12.1	Benefits	306	484	476
21.0	Travel	254	264	272
23.1	Rental Payments to GSA	0	0	0
23.2	Rental to Others	0	0	0
25.0	Other Services	1	5	7
31.0	Equipment	0	0	0
32.0	Land and Structure	0	0	0
99.0	Subtotal	$2,706	$4,005	$3,911
Reimbursables		0	0	0
Totals		$2,706	$4,005	$3,911

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION

OVERVIEW

BOARD OF CONTRACT APPEALS

The Board of Contract Appeals resolves contract disputes and related matters involving the Department and its contractors in a quasi-judicial manner. This function is performed pursuant to the Contract Disputes Act of 1978. In addition, this Board, by delegation of authority from the Secretary, acts specifically as: The Contract Adjustment Board on applications for extraordinary contractual relief under Public Law 85-804; the Invention Licensing Appeals Board on appeals involving the patent rights of the Department; the Financial Assistance Appeals Board on disputes involving grants, cooperative agreements, loan guarantees and other financial assistance arrangements; and, the Patent Compensation Board pursuant to the Atomic Energy Act of 1954. The Board may also act to resolve other quasi-judicial matters as assigned by the Secretary.

The purpose of the Board is categorized as follows:

- Serving the needs of the Department for a good and effective working relationship between the Department and its contractors, grantees, licensees, etc., by providing an impartial forum for inexpensive and speedy resolution of disputes.
- In a quasi-judicial manner, providing a means for coordinating those actions taken by its officials which result in factual or legal disputes -- before a dispute is appealed to a court of law.
- Conserving both Department resources and other public and private resources by reducing the need for litigation before the Federal Courts.
- Assisting in maintaining the credibility of the Department through a Board chartered to provide impartial, fair resolution of disputes.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

LEAD TABLE

Board of Contract Appeals

	FY 1989 Actual	FY 1990 Appropriation[1]	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Board of Contract Appeals:						
Full-time permanent	$ 363	$ 421	$ 422	$ 394	$ -28	-7%
Other compensation	0	0	0	0	0	0
Benefits	43	47	47	43	-4	-8%
Travel	0	4	4	4	0	0
Services	1	1	1	1	0	0
Subtotal	$ 407	$ 473	$ 474	$ 442	$ -32	-7%
Use of Unobligated Balances	+29	-78	-78	0	+78	+100%
Total	$ 436	$ 395	$ 396	$ 442	$ +46	+12%
Staffing, Total FTE's	8	8	8	8		

[1]FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and P.L. 101-164 reductions to fund anti-drug activities.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
BOARD OF CONTRACT APPEALS
(Dollars in Thousands)

SUMMARY OF CHANGES

FY 1990 Program Level	$395
Adjustments - Pay Cost	+1
FY 1990 Base	$396
FY 1991 Congressional Budget Request	$442

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST

OVERVIEW

Office of General Counsel

The Office of General Counsel is responsible for providing comprehensive legal services to the Secretary and the Department. Those services include legal counsel with respect to every program and function established by the Department, with the exception of those relating to the Federal Energy Regulatory Commission; legal review of virtually all significant Departmental proposed actions; and, the defense of those matters through both judicial and administrative litigation in both federal and state courts, at the trial and appellate level. Because of the diversity and magnitude of the Department's activities a single office within General Counsel may be responsible for providing legal services with respect to as many as 50 different statutes, and the legal expertise required may encompass the entire range of the law, from issues of Constitutional proportions to Personnel law matters affecting individual employees.

Besides providing legal services covering almost the entire spectrum of the law, the General Counsel also is responsible for conducting several programs of Department-wide application.

The Patent Program manages and protects the Department's wealth of intellectual property, whether it be in the form of a patent, trademark or copyright, that is engendered by virtue of the billions invested in the Department's research and development activities. The Standards of Conduct program implements the statutory requirements of the Department's organic Act and other statutes establishing the ethical standards with which each present and former employee of the Department must comply on an annual basis.

In addition to these formal programs, the Office of General Counsel also is responsible for coordinating the review and clearance among the Department's many offices of Congressional testimony and associated responses to questions, speeches, and legislation. Finally, the General Counsel is responsible for ensuring compliance with the Administration's Regulatory Reform program

established by Executive order 12291 and Executive order 12498 that governs every regulatory initiative of the Department from its inception to its final promulgation.

The Office of General Counsel assists other Departmental elements by providing legal support to their programs. For instance, we are intricately involved in the drafting and review of all proposed legislation for Congressional action.

The General Counsel Office provides essential legal support to the Department concerning new Executive initiatives. This could include continued interest in defederalizing the Power Marketing Administrations and the Naval Petroleum Reserve. Proceeds from such successful sale will assist to lower our nation's budget deficit.

As the Department devotes greater resources to both environmental and security needs, the General Counsel Office is anticipated to allocate increased resources to provide the necessary legal support to effectuate our Departmental goals. The General Counsel Office anticipates that legal work associated with the Nuclear Waste Policy Act (NWPA) will continue its steady pace. The General Counsel Office projects at least 3.0 FTE usage in FY 1990 and FY 1991, respectively. We anticipate increased NWPA related activity in licensing and site characterization in furthering Departmental goals. These NWPA costs must be billed by law to the Nuclear Waste Fund.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

LEAD TABLE

Office of General Counsel

General Administration	FY 1989	FY 1990[1/]	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Program Direction						
Support Funding	$ 1,451	$ 1,508	$ 1,508	$ 1,348	$-160	-11%
Personnel Expenses	9,675	10,244	10,244	9,611	-633	- 6%
Total Operating Expenses	$11,126	$11,752	$11,752	$10,959	$-793	- 8%
Less Use of Unobligated Balance	- 252	-1171	--	--	--	--
	$10,874	$10,581	$11,752	$10,959	$-793	-8%
Staffing Level	158[3/]	159[3/]		159[2/]		

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1/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and P.L. 101-164 reductions to fund anti-drug activities

2/ Does not reflect five FTE's billed to Nuclear Waste Fund.

3/ Does not reflect three FTE's billed to the Nuclear Waste Fund.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

SUMMARY OF CHANGES

Office of General Counsel

FY 1990 Appropriation	$10,581
FY 1991 Base	10,581
Increase Personnal Expenses	+378
FY 1991 Congressional Budget Request	10,959

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

OFFICE OF GENERAL COUNSEL

KEY ACTIVITY SUMMARY

I. Preface: Office of the General Counsel

The Office of General Counsel is responsible for providing comprehensive legal services to every program and functions established by the Department, with the exception of the Federal Energy Regulatory Commission.

II.A. Summary Table

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Summary Funding.....	$ 1,451	$ 1,508	$ 1,348	+2%
Personnel Expense.....	9,423	9,073	9,611	0%
Total Operating Expenses....	$10,874	$10,581	$10,959	0%
Total FTE's	158	159	159	

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III. Activity Descriptions

Program Activity	FY 1989	FY 1990	FY 1991
Executive Office of the General Counsel: Constituent Deputy General Counsel and Administrative Office.	Provide administrative services and policy direction to Deputies General Counsel and their staff. Provide legal advice to the Secretary, Deputy Secretary, and Under Secretary in all areas. Represents the Department in interagency working groups concerned with legal issues and in liaison with other state and federal agencies.	Constant workload anticipated because of policy-sensitive issues requiring the attention of the General Counsel.	Provide necessary policy oversight to OGC operations.
Personnel Expenses	$ 769	$ 748	$ 823
Support Funding	102	110	110
Total	$ 871	$ 858	$ 933
Total FTE's	12	13	13

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III. Activity Descriptions - Cont'd.

Program Activity	FY 1989	FY 1990	FY 1991
Deputy General Counsel Office for Environment, Conservation, and Legislation: Constituent Assistant General Counsel Offices provide necessary legal support in Environment, Conservation, Legislation and Regulations, respectively.	Key activities include reviewing and clearing all Federal Register notices, the drafting and analysis of legislation, coordinating all Congressional testimony and interrogatories, providing legal advice to states on the disposition of monies recovered in the global Stripper Well, SECP and Exxon settlements, negotiating environmental compliance agreements with states and the EPA, and providing legal counsel to the Assistant Secretaries for Congressional, Intergovernmental and Public Affairs, Conservation and Renewable Energy, and Environment, Safety and Health.	Anticipate constant workload in most areas with new initiatives in environmental enforcement and compliance including MRS licensing and site characterization requirements.	Provide necessary legal support in environment, conservation regulatory and legislative matters.
Personnel Expenses	$ 1,915	$ 1,717	$ 1,788
Support Funding	308	290	250
Total	$ 2,223	$ 2,007	$ 2,038
Total FTE's	29	29	29

III. Activity Descriptions - Cont'd.

Program Activity	FY 1989	FY 1990	FY 1991
Deputy General for Litigation: General and Special Assistant General Counsel Offices provide necessary litigation support on behalf of DOE. Major victories in Exxon and radiation injury cases.	Key activities include the defense of the DOE in lawsuits claiming radiation and toxic injury, violations of equal employment regulations, as well petroleum entitlements. Major accomplishments include important victories in Stripper Well and SECP settlements.	Anticipate increasing litigation activity with increased casework regarding the Nuclear Waste Policy Act and radiation injury case.	Sufficient legal support for all regulatory and non-regulatory litigation.
Personnel Expenses	$ 1,315	$ 1,190	$ 1,298
Support Funding	207	207	171
Total	$ 1,522	$ 1,397	$ 1,469
Total FTE's	23	23	23

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III. Activity Descriptions - Cont'd.

Program Activity	FY 1989	FY 1990	FY 1991
Deputy General Counsel for Programs: Constituent Assistant General Counsel Offices provide necessary legal support in Nuclear Affairs, Natural Gas and Mineral Leasing, Regulatory Interventions and Power Marketing, and Procurement and Finance.	Key activities include examination of nuclear export license applications under the Nuclear Non-Proliferation Act, Price-Anderson nuclear liability legislation, review of legal issues concerning uranium enrichment and transportation of spent nuclear fuels, implementation of the legal provision of legal assistance to ensure the physical security of weapons facilities, the deregulation and pricing of natural gas, legal counsel to power marketing authorities, intervention before state regulatory bodies on behalf of DOE, analysis of contracts, of the federal government's second largest procuring agency, analysis of loan guarantee arrangements	Anticipate constant activity with emphasis on the deregulation of natural gas, the divestiture of the Alaska Power Administration, and increased contract work for Supercolider and other Departmental initiatives.	Provide sufficient legal support for nuclear affairs, natural gas and mineral leasing, regulatory intervention and power marketing, and procurement and finance matters.

III. Activity Descriptions - Cont'd.

Program Activity	FY 1989	FY 1990	FY 1991
	for new energy technologies, and the provision of legal counsel to the Assistants Secretary for Defense Programs, Nuclear Energy and Fossil Energy.		
Personnel Expenses	$ 2,740	$ 2,745	$ 2,924
Support Funding	413	470	406
Total	$ 3,153	$ 3,215	$ 3,330
Total FTE's	47	47	47

III. Activity Descriptions - Cont'd.

Program Activity	FY 1989	FY 1990	FY 1991
Depty General Counsel for Legal Services: Constituent Assistant General Counsel Office provide necessary legal support in International Affairs, Patents and General Law.	Key activities include providing legal counsel on International Energy Agency issues, the processing of patent applications and waivers, conducting litigation protecting DOE's intellectual property, reviewing FOIA and Privacy Act requests, assuring compliance with the Ethics in Government Act, representing DOE in MSPB and EEOC actions, reviewing import restrictions, providing legal support for Strategic Petroleum Reserve and emergency preparedness issues, assisting the Assistants Secretary for Fossil Energy, International Affairs and Emergency Preparedness, and Management and Administration.	Anticipate constant workload with emphasis on international trade developments, defederalization of the Naval Petroleum Reserve, and class waivers on patent applications.	Provide necessary legal support in international affairs, patents and general law.
Personnel Expenses	$ 2,740	$ 2,672	$ 2,780
Support Funding	413	432	409
Total	$ 3,153	$ 3,104	$ 3,189
Total FTE's	47	47	47
Total for GC	$10,874	$10,581	$10,959
Total FTE's for GC	158	159	159

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

OBJECT CLASS SUMMARY

Office of General Counsel

Direct Funding:	FY 1989	FY 1990	FY 1991
11.1 Full-time permanent	$ 7,707	$ 7,358	$ 7,895
11.3 Other than full time	541	540	541
11.5 Other compensation	30	30	30
11.9 Total personnel compensation	$ 8,278	$ 7,928	$ 8,432
12.1 Benefits	1,145	1,145	1,145
21.0 Travel	168	175	166
25.0 Other services	1,283	1,333	1,182
99.9 Total obligations	$10,874	$10,581	$10,959
Total FTE's	158	159	159

OVERVIEW

MANAGEMENT AND ADMINISTRATION

The Office of the Assistant Secretary, Management and Administration (MA) provides centralized administrative oversight, policy direction and procedural guidance for the full range of Department of Energy (DOE) program operations at Headquarters and field installations. Major areas of responsibilities include:

- Organization, manpower and management systems
- Personnel management
- Federal employee occupational safety and health program
- Telecommunications management
- Freedom of information
- Performing and supplying administrative services
- Space management
- Program, project, construction and facilities management
- Automated data processing development, management and acquisition
- Budget, accounting, payroll and financial control and verification
- Centralized repository, document control and coordination for Secretarial action and signature activities
- Contractor human resources management
- Management and control of financial resources
- Management information system development
- In-house energy management
- Real and personal property management
- Building and engineering support
- Scientific and technical information management
- Strategic facilities utilization management
- Equal employment opportunity and civil rights matters
- Small business and disadvantaged business utilization
- Procurement, contracting, sales, financial assistance and business activities

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Significant Recent Accomplishments:

- Participated, as a member of the Site Selection Task Force, in the final selection of Texas as the preferred site for the Superconducting Super Collider (SSC).
- Participated in approximately 20 utility rate interventions with a potential savings to DOE of over $16 million.
- Established a capability (Computer Incident Advisory Capability) to assist Departmental sites in responding to computer security incidents.

- Submitted a comprehensive DOE-wide Printing and Publishing 3-Year Plan to the Joint Committee on Printing.

- Standardized the Library's computer databases and operating systems to reduce costs, enhance functionality, streamline operations and provide networking capabilities.

- Served as a pilot agency to develop a mainframe to mainframe link to Treasury's financial management system for the purpose of electronically transmitting year-end financial statements for the Department.

- Implemented the Departmental Integrated Standardized Core Accounting System (DISCAS) at the Federal Energy Regulatory Commission (FERC) and completed a core compliance review to further standardize DOE's accounting system.

- Implemented systems and procedures to report delinquent debts to credit reporting bureaus and the Internal Revenue Service (IRS) for offset from income tax refunds. Through the use of notices to the debtors advising of the potential referral of their debts to credit reporting bureaus and the IRS, voluntary refunds of outstanding debts have been recovered and installment repayment arrangements have been entered into.

- Continued the ongoing effort to reduce the Department's inventory of inactive instruments and the recovery of unliquidated obligations commenced in FY 1985; this effort has been very successful and has significantly reduced the inactive backlog.

- Implemented a DOE-wide program for use of credit cards for small purchase actions.

- Completed cost reduction actions, required by P.L. 99-272, Federal Motor Vehicle Expenditure Control, realizing savings for FY 1986 thru FY 1988, of approximately $34.5 million; the OMB established goal for DOE was $7.4 million.

- Developed a program plan and implementation schedule for the Drug Free Federal Workplace Testing and Education Program.

- Continued initiatives to improve productivity and health and safety at DOE operations through cooperative labor-management initiatives and collective bargaining.

- Implemented the Department's Integrated Security System for nationwide operational use. Allows centralized tracking of the status of all DOE and contractor clearances, and visits for classified purposes by U.S. citizens at each DOE facility.

Major Program Objectives for FY 1990 Through FY 1995:

- Serve as Headquarters focal point for SSC real estate actions and provide oversight of land acquisition by the State of Texas.
- Conduct annual project validation reviews in support of the Internal Review Budget process.
- Design and construct child care development centers for the Germantown and Forrestal buildings.
- Improve the safety and health of Headquarters employees by continuing to eliminate building-related potential safety and health hazards.
- Conduct DOE-wide mail management review for compliance with established policies and regulations to reduce mail cost.
- Replace the existing Departmental Integrated Standardized Core Accounting System (DISCAS) hardware at various operating sites with current state-of-the-art minicomputers (scheduled to be completed in FY 1990).
- Establish a state-of-the-art automated vacancy announcement system (touch screen) in Forrestal and Germantown lobbies for use by outside job seekers.
- Implement a DOE-wide Foreign Travel Management System (FTMS) to improve the timeliness and processing approvals for foreign travel requests throughout the Department.
- Enhance the Government Open Systems Interconnection Profile (GOSIP) standards program to ensure the successful migration of DOE's computer networks to GOSIP. Also, implement the GOSIP Routing/Registration Authority database.
- Implement a White House and Federal Communications Commission mandated program for the priority provisioning and restoral of DOE emergency and essential telecommunications.
- Continue to increase automation in the budget formulation and presentation activities, thereby reducing paperwork and enhancing the detail necessary to effectively explain and defend Departmental program budgets before OMB and Congress.

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- Publish an upgraded Accounting Practices and Procedures Handbook.
- Improve the collection and debt allocation functions by implementing the IRS Refund Offset Program and Credit Bureau Reporting System DOE-wide, direct transmission of receivable and IRS offset data to Treasury, and a collection agency program.
- Ensure that equal employment opportunity and affirmative action programs are fully institutionalized within the Department of Energy.
- Oversee and require strict compliance of the Competition in Contracting Act. Foster and promote competition in contracting, compliance, and reporting requirements through a Departmentwide system of contracting activity competition advocates and organizational points of contact.
- Increase participation in socio-economic procurement programs through improved operations and outreach.
- Continue to reduce the Department's inventory of inactive procurement and assistance instruments and the recovery of any unliquidated obligations.
- Provide effective oversight of, and input to, the Source Evaluation Board (SEB) process in connection with major Departmental procurements.
- Develop a centralized recruitment assistance program to improve recruitment of high-caliber engineers, scientists, and technical applicants.
- Develop comprehensive automated data processing and management information support for the Departmental Directives System.
- Maintain Advisory Committee Management oversight functions for the Department's Advisory Committees.
- Conduct analyses of all significant headquarters and field organization proposals and advise on organizational effectiveness and manpower efficiencies.
- Design and implement a new Manpower Analysis and Planning System (MAPS) for the Department.
- Implement policy on contractor's substance abuse programs and employee assistance programs.
- Enhance capabilities for responding to computer security incidents and undertake other initiatives to ensure computer security effectiveness.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

LEAD TABLE

MANAGEMENT AND ADMINISTRATION

Activity	FY 1989 Actual	FY 1990 Estimate 2/	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Operating Expenses	$160,487	$164,244	$164,816	$155,674	$-9,142	-6%
Capital Equipment	6,220	2,438	2,438	3,745	+1,307	+54%
Program Subtotal	$166,707	$166,682	$167,254	$159,419	$-7,835	-5%
Use of unobligated balances	- 54,965	- 43,715	- 16,400	- 16,400	0	0
Budget Authority	$111,742	$122,967	$150,854	$143,019	$-7,835	-5%
Staffing (FTEs) 1/	1261	1212	1212	1212		

Authorization: P.L. 95-91

1/ Excludes FTEs requested and funded by Nuclear Waste Fund (FY 1989: 5 FTEs, FY 1990: 6 FTEs, FY 1991: 6 FTEs).

2/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and P.L. 101-164 reductions to fund anti-drug activities.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

SUMMARY OF CHANGES

MANAGEMENT AND ADMINISTRATION

FY 1990 Program Level	$166,682
- GSA Rent Increase	+352
- FTS Increase	+220
FY 1991 Base	167,254
Salaries	
- Reduce Workers' Compensation request to exclude requirements for PMAs	-736
- Repricing of salary expenses	-922
Travel	
- Decrease in travel funds	-275
Support Services	
- Decrease ADP and administrative support	-7,209
Capital Equipment	
- Increase will provide funding for peripheral ADP equipment in support of the mainframe computer center	+1,307
FY 1991 Congressional Budget Request	$159,419

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

MANAGEMENT AND ADMINISTRATION

I. Preface: Management and Administration

Management and Administration provides a wide range of institutional support services to the headquarters organizations and to the Department as a whole. Areas of support include management policies and procedures; personnel management; project and facilities management; administrative services; automatic data processing and communications; contractor industrial relations; financial management; procurement; coordination of correspondence; and equal opportunity activities. The funding request reflects requirements for salaries, benefits, travel and personnel support costs.

II. A. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
Personnel Compensation	$ 45,552	$ 45,187	44,347	-2%
Other Compensation	3,462	3,539	3,595	+1%
Benefits	9,365	9,410	8,576	-9%
Travel	2,098	2,180	1,905	-13%
Support Services	100,010	103,928	97,291	-6%
Capital Equipment	6,220	2,438	3,765	+54%
Total, Management and Administration	$ 166,707	$ 166,682	$ 159,419	- 4%

II. B. Major Laboratory and Facility Funding

	FY 1989	FY 1990	FY 1991	% Change
Lawrence Livermore National Lab	$ 150	$ 0	$ 0	0%
Nevada Operations (EG&G)	$ 965	$ 965	$ 790	18%
Oak Ridge Associated Universities	$ 347	$ 372	$ 374	0%
Richland Operations (BHI)	$ 125	$ 0	$ 0	0%

III. Activity Descriptions: (Budget Obligations in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Management and Administration			
Salaries and Expenses			
Personnel Compensation	Funding for full-time permanent FTEs to provide support to the Department on an overall basis. MA provides a wide range of policy development, oversight and institutional support services to all of the headquarters organizations and the Department as a whole.	Funding for full-time permanent FTEs to provide support to the Department on an overall basis. MA provides a wide range of policy development, oversight and institutional support services to all of the headquarters organizations and the Department as a whole.	Funding for full-time permanent FTEs to provide support to the Department on an overall basis. MA provides a wide range of policy development, oversight and institutional support services to all of the headquarters organizations and the Department as a whole.
	$ 45,552	$ 45,187	$ 44,347
Other Compensation	Funding for OTFTP FTEs, overtime, awards, details, annuitant/equalization pay, and SES Rank and Performance Awards.	Funding for OTFTP FTEs, overtime, awards, details, annuitant/equalization pay, and SES Rank and Performance Awards.	Funding for OTFTP FTEs, overtime, awards, details, annuitant/equalization pay, and SES Rank and Performance Awards.
	$ 3,462	$ 3,539	$ 3,555
Benefits	Funding for civilian personnel benefits to cover the Civil Service Retirement and Disability Funds, Health Benefits and Life Insurance Funds, Employees Compensation Funds, Permanent Change of Station expenses, Workers' Compensation, Unemployment Compensation and the Federal Employee Retirement System.	Funding for civilian personnel benefits to cover the Civil Service Retirement and Disability Funds, Health Benefits and Life Insurance Funds, Employees Compensation Funds, Permanent Change of Station expenses, Workers' Compensation, Unemployment Compensation and the Federal Employee Retirement System.	Funding for civilian personnel benefits to cover the Civil Service Retirement and Disability Funds, Health Benefits and Life Insurance Funds, Employees Compensation Funds, Permanent Change of Station expenses, Unemployment Compensation, Federal Employee Retirement System and Workers' Compensation. Request reflects reduction in Workers' Compensation as a result of Power Marketing Administrations covering their own requirements.
	$ 9,365	$ 9,410	$ 8,576

III. Management and Administration (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Travel	Provide official domestic and foreign travel for MA personnel, GSA motor pools and shuttle bus service to support HQ activities and travel to support Departmentwide training programs.	Provide official domestic and foreign travel for MA personnel, GSA motor pools and shuttle bus service to support HQ activities and travel to support Departmentwide training programs.	Provide official domestic and foreign travel for MA personnel, GSA motor pools and shuttle bus service to support HQ activities and travel to support Departmentwide training programs.
	$ 2,098	$ 2,180	$ 1,905
Subtotal, Salaries and Expenses	$ 60,477	$ 60,316	$ 58,383
Support Services	Provide essential support services to Headquarters including rent; telecommunications; postage; utilities; printing and reproduction; independent cost estimates; personnel, training and health services; budget, accounting and financial management; DOE drug testing program; procurement and contract administration; ADP support; equipment repair and maintenance; and supplies and materials.	Provide essential support services to Headquarters including rent; telecommunications; postage; utilities; printing and reproduction; independent cost estimates; personnel, training and health services; budget, accounting and financial management; DOE drug testing program; procurement and contract administration; ADP support; equipment repair and maintenance; and supplies and materials. New initiatives being supported at this level include temporary relocation of Forrestal personnel to accommodate renovation of Forrestal plaza deck (administrative, ADP and communications support); GSA rent increase resulting from space reclassification; renovation of Headquarters cafeteria; restoration of ADP funding to maintain current requirements level; DOE-wide project management and procurement training initiatives on value engineering, quality assurance, environment, safety and health (ES&H) activities, and upgrading skills for contracting officers; development of contractor drug free program; promotion of HBCU cooperative programs to train women and minorities in technical fields; development of an automated directives system to electronically distribute,	Provide essential support services to Headquarters including rent; telecommunications; postage; utilities; printing and reproduction; independent cost estimates; personnel, training and health services; budget, accounting and financial management; DOE drug testing program; procurement and contract administration; equipment repair and maintenance; supplies and materials and ADP support at the current operating level. Also included at this funding level are GSA rate increase and associated services for FTS and rent at Headquarters facilities.

III. Management and Administration (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Support Services (Cont'd)		collect and sort Departmental directives; and personnel management initiatives in the areas of analysis and recruitment of engineering, scientific and technical applicants, workforce planning and centralized skills enhancement.	
	$ 100,010	$ 103,928	$ 97,291
Capital Equipment	Provide for the replacement/upgrade of ADP and administrative equipment which has become unserviceable or for which further repairs would be uneconomical. Also provide for the replacement of computer equipment for the Departmental Integrated Standardized Core Accounting System (DISCAS), communications equipment for the Secure Automatic Communications Network System (SACNET); and building operations equipment to effect required maintenance resulting from the assumption of building operations from GSA.	Provide for the replacement of administrative equipment which has become unserviceable or for which further repairs would be uneconomical. Also provide for building operations equipment to effect required maintenance resulting from the assumption of building operations from GSA.	Provide for the replacement of administrative equipment which has become unserviceable or for which further repairs would be uneconomical. Also provide for building operations equipment to effect required maintenance resulting from the assumption of building operations from GSA. The requested increase will provide funding for peripheral ADP equipment in support of the mainframe computer center.
	$ 6,220	$ 2,438	$ 3,745
Management and Administration	$ 166,707	$ 166,682	$ 159,419

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(Obligation dollars in thousands)

OBJECT CLASS SUMMARY

Management and Administration

		FY 1989	FY 1990	FY 1991
Direct Funding:				
11.1	Full-time permanent	$45,552	$45,187	$44,347
11.3	Other than full-time permanent	1,133	1,164	1,170
11.5	Other compensation	2,329	2,375	2,385
11.9	Total personnel compensation	$49,014	$48,726	$47,902
12.1	Benefits	9,365	9,410	8,576
21.0	Travel	2,098	2,180	1,905
22.0	Transportation of Things	631	678	555
23.1	Rental Payments to GSA	28,926	31,581	31,933
23.2	Rental Payments to Others	93	97	79
23.3	Communication, Utilities and Miscellaneous Charges	21,915	20,032	19,360
24.0	Printing and Reproduction	2,905	3,043	2,491
25.0	Other Services	38,978	42,646	37,893
26.0	Supplies and Materials	6,562	5,851	4,980
31.0	Equipment	6,220	2,438	3,745
32.0	Land and Structure	-0-	-0-	-0-
99.0	Subtotal	$166,707	$166,682	$159,419
	Reimbursables	-0-	-0-	-0-
Totals		$166,707	$166,682	$159,419

OVERVIEW

Operations Offices

The five organizational elements responsible for the Department of Energy field execution, including energy technologies, defense, nuclear, basic and applied research and environmental programs are the Chicago Operations Office, Idaho Operations Office, Oak Ridge Operations Office, Richland Operations Office, and San Francisco Operations Office.

The remaining operations offices, Albuquerque, Nevada, and Savannah River, are funded under the Atomic Energy Defense Activities Appropriation.

The operations offices perform a wide variety of functions in support of energy activities throughout the country. Among these functions are field procurement, health and safety monitoring, property management, labor relations and maintenance of personnel and financial systems. The operations offices plan, develop and administer budgets and maintain an administrative staff to support on-going programs and projects. In addition, the operations offices have cognizance over an estimated 71,000 contractor employees located at various site offices. Additionally, as in previous years this budget supports the performance of beneficial work for others activities performed on a reimbursable basis including costs associated with the use of facilities and staff resources.

Chicago Operations Office

- Projected CH responsibilities and assignments include key elements of the following: High Energy and Nuclear Physics programs; Magnetic Confinement Fusion R&D and related test facilities; R&D for the Super-Conducting Super Collider; Basic Energy Sciences; High Temperature Superconductor Research; the advanced Reactor Base Technology programs; projects under the Civilian Radioactive Waste Management Program; Decontamination and Decommissioning efforts; Magnetohyrodynamics (MHD) projects and test facilities; conservation and renewable energy and cogeneration technology projects; state and local assistance programs, and university construction grant programs.

Chicago Operations Office--Cont.

- Laboratories and facilities operated or managed by CH include multiprogram facilities - Argonne National Laboratory (ANL) and Brookhaven national Laboratory (BNL); single purpose facilities - Ames Laboratory at Iowa State University, MIT's Bates Linear Accelerator Center, Fermi National Accelerator Laboratory (FERMILAB), Michigan State University's Plant Research Laboratory, Notre Dame Radiation Laboratory, Princeton Plasma Physics Laboratory (PPPL), and Solar Energy Research Institute (SERI); and Government operated - Environmental Measurements Laboratory (EML) and New Brunswick Laboratory (NBL).

Idaho Operations Office

- Current assignments of the Idaho Operations Office include chemical processing operations and demonstration; waste management and environmental restoration operations and demonstration; nuclear reactor safety research and remedial action programs; and programs for state and local assistance, and includes lead mission roles in such programs as: the Special Isotope and Separation (SIS) Project, Low-Level Waste Management, Magnetic Fusion Safety Research, Cask Systems Development, and the System Safety Development Center (SSDC) for the DOE Office of the Assistant Secretary for ES&H.

- In addition to carrying out its program responsibilities at the Idaho National Engineering Laboratory, the Idaho Operations Office also has jurisdiction over various programs at the following locations: Grand Junction (CO) Area Field Office; Denver (CO) Support Office; Butte (MT) MHD Project; TMI (PA) Site Office; and the West Valley (NY) Project Office.

Oak Ridge Operations Office

- The principal programs of Oak Ridge Operations (ORO) are the production of nuclear weapons components in support of national defense programs; the production of enriched uranium for defense requirements and for fuelling nuclear power plants in the United States and abroad; the processing of uranium feed materials and related production of uranium fuel cores for the Department of Energy's (DOE) plutonium production reactors; research and construction involving the Continuous Electron Beam Accelerator Facility; remedial action involving former utilized nuclear processing facilities; extensive energy research and development; and maintaining in standby readiness the Strategic Petroleum Reserve to reduce the nations vulnerability to the effects of petroleum supply interruptions.

- Laboratories and facilities operated or managed by the Oak Ridge Operations Office include: Oak Ridge National Laboratory, Oak Ridge Gaseous Diffusion Plant, A-12 Plant, Oak Ridge Associated Universities, Paducah gaseous Diffusion Plant, Portsmouth Gaseous Diffusion Plant, and the Feed Materials Production Center.

Richland Operations Office

- Currently, the Richland Operations mission is accomplished primarily in Government-owned facilities for the Department by four integrated contractors. The contractors include an architect-engineering construction contractor (Kaiser Engineers Hanford), an operations and engineering contractor (Westinghouse), a research and development contractor (Pacific Northwest Laboratories) and a health services and environmental contractor (Hanford Environmental Health Foundation). Under the present operations, approximately 14,100 contractor employees perform the actual research and development, chemical processing, defense waste management and nuclear energy technology development (fast flux test facility) as well as a variety of site services.

Richland Operations Office--Cont.

- The enactment of the Nuclear Waste Policy Act Amendment on December 22, 1987, has resulted in the phase out of the Civilian Waste Management (Basalt Waste Isolation Project) program at Richland as well as a reorganization of the operations office effective in March 1988, which resulted in the creation of the environmental restoration program. A relatively small staff of federal employees, funded primarily through the Departmental Administration appropriation, has the overall responsibility for general management and direction of department programs and activities.. Included are safety and environmental protection, financial administration of funds, procurement and contract administration, safeguards and security, and appraisal of contractor performance.

San Francisco Operations Office

- The San Francisco assignment is to execute program and project activities in Defense, Nuclear Energy, Magnetic Fusion, Energy Research, and Conservation and Renewables Programs. The office manages several DOE laboratories, including Lawrence Livermore National Laboratory, Lawrence Berkeley Laboratory, Stanford Linear Accelerator Laboratory and the Energy Technology Engineering Center, and DOE Research Laboratories including laboratory of Biomedical and Environmental Sciences (UCLA), Laboratory of Energy-Related Health Research (UCD), and the Laboratory of Radiobiology (UCSF).

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

LEAD TABLE

Operations Offices

	FY 1989	FY 1990[1]	FY 1991 Base	FY 1991 Request	Program Change Request vs. Base Dollar	Program Change Request vs. Base Percent
Operations Offices Summary:						
- Operating Expenses.....	$112,444	$109,092	$109,174	$108,192	$ -982	-9%
- Capital Equipment.....	1,118	1,162	1,163	1,197	+34	+3%
Subtotal, Operations Offices.	$113,562	$110,254	$110,337	$109,389	-948	-9%
Use of Prior Year Unobligated Balances.....	-6,027	+208	---	---	---	---
Total, Operations Offices.....	$107,535	$110,462	$110,337	$109,389	-948	-9%
Staffing (FTE's).....	1,655	1,475	1,475	1,475	---	---

[1]FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and P. L. 101-164 reductions to fund anti-drug activities.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

SUMMARY OF CHANGE

Operations Offices

FY 1990 Appropriation	$ 110,254
	- 865
	109,389
FY 1991 CONGRESSIONAL Budget Request	$ 109,389

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

Operations Offices

Program Activity	FY 1989	FY 1990	FY 1991
Salaries and Expenses:			
Total funding supports FTE Salaries and related expenses which include: Full-time permanent (FTP) base salaries, other compensation for other-than-full-time-permanent (OTFTP) positions, terminal leave, overtime, awards, equalization pay, and benefits (which cover expenses to the civil service retirement and disability, employees health benefits, life insurance funds, payments to the employees compensation fund, FICA taxes, moving expenses, permanent change of station (PCS) moves, and benefits for former employees.	$ 79,113	$ 74,455	$ 72,478

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Travel: Provides funding for official travel and minor amounts of GSA motor pools and PCS moves.	2,413	2,508	2,582

Program Activity	FY 1989	FY 1990	FY 1991
Support Services:			
Provides funding for fixed costs such as rent, utilities, communications, printing and reproduction, & supplies and materials; maintenance of equipment and vehicles; ADP services; building operations; health; training; PCS moves; security and safety analysis and review.....	$ 30,918	$ 32,129	$ 33,132
Capital Equipment:			
Provides funding for acquistion/ fabrication of equipment not related to construction projects.....	1,118	1,162	1,197
Total, Operations Offices.....	$113,562	$110,254	$109,389
Staffing Total, FTE's	1,655	1,475	1,475

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION

OVERVIEW

OFFICE OF MINORITY ECONOMIC IMPACT

The goals and mission of the Office of Minority Economic Impact (MI) is to advise the Secretary on the impacts of energy policies, programs, regulations and other Department of Energy actions on minorities and to recommend policies to assist minorities, minority educational institutions, and minority businesses affected by the Department's actions. MI is also to provide advice to the Secretary on methods of increasing minority participation in the Department's programs and activities. In carrying out these responsibilities, the Office formulates and manages programs to provide research, management and technical assistance, and financial assistance to minority businesses, educational institutions and developmental organizations to enable them to participate in the Department's research, demonstration, grant, contract or other program opportunities.

Energy security and increased U.S./world competitiveness will be achieved only if an efficient and stable economy is maintained. This can be accomplished only through the implementation of energy policy, program alternatives, and those strategies which enhance the educational infrastructure and the technical information available to assist all communities. Such alternatives and strategies are essential in minority communities where the majority of the households spend a disproportionate share of their income on residential energy, have few discretionary energy options, and are not full participants in the development and commercialization of energy solutions. Finally, the severe underrepresentation of minority employment and business participation in the dynamic high-technology energy industry imposes a severe challenge to our important national security objectives and world competitiveness.

The Office is conducting a thorough review of its current programs to identify areas that may be modified to provide additional support in mathematics and science education. Additional reviews are being conducted to determine means of expanding the amount of funding deposited in minority financial institutions and improving the effectiveness of the Business Loan Program.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DIRECTOR OF MINORITY ECONOMIC IMPACT
(dollars in thousands)

LEAD TABLE

Office of Minority Economic Impact

Activity	FY 1989 Actual	FY 1990 Estimate _1/	FY 1991 Base	FY 1991 Request	Program Change Request vs Base	
					Dollar	Percent
Research						
Data Development and Minority Energy Assessment Model						
Operating Expenses	$ 0	$ 236	$ 236	$ 0	$ -236	-100%
Policy Assessments and Analyses						
Operating Expenses	$ 0	$ 309	$ 309	$ 439	$ +130	+42%
Technical Market Analysis and Information						
Operating Expenses	$ 0	$ 124	$ 124	$ 380	$ +256	+206%
Subtotal, Research	$ 0	$ 769	$ 769	$ 819	$ +50	+7%
Management and Technical Assistance						
Minority Honors Training Program						
Operating Expenses	$ 408	$ 417	$ 417	$ 431	$ +14	+3%
Minority Educational Institution Assistance						
Operating Expenses	$ 198	$ 4,566	$ 1,681	$ 1,322	$ -3,244	-71%
Minority Energy Information Clearinghouse						
Operating Expenses	$ 0	$ 133	$ 133	$ 36	$ -97	-73%
Minority Business and Community Development						
Operating Expenses	$ 0	$ 513	$ 513	$ 234	$ -299	-58%
Subtotal, Management and Technical Assistance	$ 600	$ 5,629	$ 2,744	$ 2,013	$ -3,616	-64%

_1/ The FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and P.L. 101-164 reductions to fund anti-drug activities.

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LEAD TABLE - Office of Minority Economic Impact (cont'd)

Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Base	FY 1991 Request	Program Change Request vs Base	
					Dollar	Percent
Financial Assistance						
Rural Development Financial Assistance Operating Expenses	$ 0	$ 0	$ 0	$ 0	$ 0	0%
Business Loan Program Operating Expenses	$ 0	$ 0	$ 0	$ 0	$ 0	0%
Subtotal, Financial Assistance	$ 0	$ 0	$ 0	$ 0	$ 0	0%
Program Direction Operating Expenses	$ 682	$ 674	$ 674	$ 616	$ -58	-9%
TOTAL	$ 1,282	$ 7,072	$ 4,049	$ 3,448	$ -601	-15%
Summary						
Operating Expenses	$ 1,282	$ 7,072	$ 4,049	$ 3,448	$ -601	-15%
Total Program	$ 1,282	$ 7,072	$ 4,049	$ 3,448	$ -601	-15%
Use of Unobligated Balances	+ 2,805	- 3,023	4,049	0	-4,053	100%
Total Budget Authority	$ 4,087	$ 4,049	$ 4,049	$ 3,448	$ -601	-15%
Staffing (FTE's)	11	11	11	11		

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF MINORITY ECONOMIC IMPACT
(dollars in thousands)

SUMMARY OF CHANGES

Office of Minority Economic Impact

FY 1990 Appropriation	$4,049
Adjustment - Pay cost supplemental	0
FY 1991 Base	$4,049
Research	
- Increases emphasis on policy assessments and analyses and technical market analyses and temporarily decreases emphasis on data base development	+ 7
Management and Technical Assistance	
- Maintains the Minority Honors Training Programs in energy for financially needy minority honor students at 8 colleges, continues to maintain the Minority Educational Institution Assistance Program, maintains Minority Energy Information Clearinghouse activities at prior working levels and focuses on implementing economic development asssistance to minority businesses	-64
Financial Assistance	
- Bank Deposit Financial Assistance Program Administration continued as in prior years and restructures the administration of the Business Loan Program	0
Program Direction	
- Provides operating expenses for a staff of 11 FTEs to implement the MI Programs	-9
FY 1991 Congressional Budget Request	$3,448

1559

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

RESEARCH

I. Preface: Research

The Research Program develops a quantitative framework for determining the effects of national energy policies and programs, legislation and regulations on minorities; provides regional socioeconomic and other information and related analysis for policy and programmatic efforts within DOE, in other Federal and State agencies, and in energy industry organizations; and develops focused technical assistance relating to new energy technologies to assist business entrepreneurs and minority educational institutions and communities. Analytical tools previously developed for the program are ready so it is necessary to periodically update and extend the analytical capabilities of the program in forecasting and assessing the impact of energy programs and policies on minorities and in analyzing the macro, micro, and distributional economic effects of various energy policies and programs; utilizing appropriate economic models and theoretical structures and focusing on regional price and income elasticities for various fuels in various market segments. The impact of energy programs and issues upon particular minority population groups compared to other population segments and in new energy technology industries are critical to carrying out the objectives of the program.

II. A. Summary Table: Research

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Data Development and Minority Energy Assessment Model	$ 0	$ 336	$ 0	-100
Policy Assessments and Analyses	0	309	439	+ 42
Technical Market Analysis and Information	0	124	380	+206
Total, Research	$ 0	$ 769	$ 819	+ 7

1560

III. Activity Descriptions: (Obs $$ in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Research			
Data Development and Minority Energy Assessment Model	A structured Minority Economic Model will be finalized and incorporated into the NEAM to increase its policy-sensitive capability. The various public use sources of data will be integrated into one comprehensive data file with the establishment of a consensus system and the application of pooling techniques required to ensure consistency between disaggregated and aggregated data. Work will continue to update and validate the transportation model component of the NEAM with the generation of appropriate cost indices, vehicle miles travelled models, and more reliable trip and vehicle attributed data for generating reliable fuel consumption data. (90)	The specific quantitative framework through which transportation energy policy can be assessed will be augmented to make it consistent to the residential component. These will be integrated through systems development efforts to include other sophisticated model estimation and assessment techniques, sensitivity analysis, and appropriate validation methods to establish the most credible approaches to achieve energy impact assessments within the energy technology environment. ($325)	The direction of the program is being integrated to refocus on enhancing MI's ability to respond to Policy Assessment Development and Technical Market Analysis and information program development by incorporating the existing quantitative framework developed into the other two subtasks. (90)
	$ 0	$ 325	$ 0
Policy Assessments and Analyses	The inherent bias against minorities in the formula used to allocate weatherization funds to the States will be reviewed. Distribution schemes of energy supplies (e.g., nuclear waste and SPR), including the distribution of costs and benefits and the specific impacts of various scenarios, the criteria used to distribute the reserves, the selling price, and the impact of such policies on minority workers, will be assessed to provide the policy and other DOE offices with regional impact indicators. In addition, a national set of energy	The effects of life-line rates of the utility industry on the energy consumption and expenditure patterns of minorities will be thoroughly evaluated, since they appear to be counter-productive and have been providing high income households with an unwarranted subsidy. This will enable DOE to assist State public utility commissions in assessing the impact of these rate structures on different population categories and establish a quantitative framework for revising the rates and establishing more equity among rate determinations for various industry sectors. ($309)	Provides a coordinated effort with DOE policy offices for the focused inclusion of MI constituents socioeconomic analyses in major DOE programs through the analysis of such programs, national legislation state and local programs for the achievement of the Nation Energy Goals. The design is to provide the legislative and policy base for the inclusion of minorities assessments on a national, State and local bases for socioeconomic development with energy programs. ($439)

III. Research (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Policy Assessments and Analyses (Cont'd)	policy options relating FERC rulemaking proceedings and/or mechanisms to determine different energy fuel prices will be developed for Departmental consideration. (90)		
	$ 0	$ 309	$ 439
Technical Market Analysis and Information	The focus on market research and financial planning analyses will be maintained with limited efforts to assist minority business entrepreneurs with technical information for their planning activities and their business assessments in the energy industry; with specific emphasis on new energy technologies. (90)	The potential long-run effects associated with the implementation of advanced technologies, such as the impact of widespread use of superconductors in the generation of electricity, will be assessed, and relevant technical information generated and incorporated with the HI business development program efforts, in addition to widespread dissemination through the Clearinghouse to HI's constituents. (6124)	Research will focus on the identification of technologies which can be analyzed for development and commercialization in minority communities. - Economic assessment of these projects and marketing strategies for the technologies will be develop. System development will be driven by the analysis of market scenarios and minority participation in the DOE mission of energy efficiently and nation energy goals. Focus will be on the assessment of employment opportunities associated with the application of the implementation of new technology, assisted commercialization of energy products and other assistance to entrepreneurs in minority communities will be implemented. (6200)
	$ 0	$ 124	$ 380
Research	$ 0	$ 769	$ 819

1562

KEY ACTIVITY SUMMARY

MANAGEMENT AND TECHNICAL ASSISTANCE

I. Preface: Management and Technical Assistance

MI provides a Management and Technical Assistance Program to minority educational institutions, developmental organizations, and minority business enterprises to enable them to participate in market research, planning, economic and business analysis and program and contract opportunities within the Department and the energy industry. Social progress can be linked to scientific and technical advancement within all aspects of our nation; the implementation of MI's program strategies for management and technical assistance will contribute to the Department's national goals. Focused investments in educational resources and the infrastructure will establish the needed reservoir of basic technical knowledge in the high technology energy environment. Constructive and effective business development for minority entrepreneurs, focused on integrating technical and economic development strategies, will encourage innovation and entrepreneurship will improve the level of competition in the energy arena.

II. A. Summary Table: Management and Technical Assistance

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Minority Honors Training Program	$ 402	$ 417	$ 431	+ 3
Minority Educational Institution Assistance	198	4,566	1,322	- 71
Minority Energy Information Clearinghouse	0	133	36	- 73
Minority Business and Community Development	0	513	224	- 56
Total, Management and Technical Assistance	$ 600	$ 5,629	$ 2,013	- 64

26-657 O—90——50

III. Activity Descriptions: (Dollars in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Management and Technical Assistance			
Minority Honors Training Program	Maintained the number of colleges receiving DOE scholarship support. Encouraged industrials to increase their activities with the colleges. Provided for some expansion of the number of students supported at each college and/or increased support for student retention. (9482)	Continues support for scholarships to financially needy minority honor students for training in energy-related technologies. Initiates activities to increase efforts to obtain State funds and industrial funds to continue student support. (9417)	Continues support to approximately 300 students at two-year colleges who are receiving training for energy careers. Provides for limited support to develop and enhance linkages between these institutions, industry, DOE operating contractors, and national laboratories. Supports an annual conference/workshop to develop and document program successes and innovations. (9431)
	$ 482	$ 417	$ 431
Minority Educational Institution Assistance	Continued funding for research centers and private sector projects initiated in prior years. Continued to support travel associated with the development of new proposals or the continuation/renewal of existing proposals. Continued to coordinate and implement activities that will build alliances between minority educational institutions, professional organizations, foundations, and the public and private sectors. Coordinated and implemented recommendations on building alliances with minority institutions from the White House Initiative on Historically Black Colleges and Universities and the Interim Report of the Task Force on Women Minorities and The Handicapped in Science and Technology. (6178)	Continues support of the implementation of research centers in the computational sciences, physical and life sciences and engineering that are engaged in energy- related activities and evaluate the results. Evaluates the effectiveness of incentives to increase faculty participation in research. Documents the feasibility of multidisciplinary, collaborative research at minority universities. Provides technical assistance in the design and implementation of improved research administration methods at minority educational institutions. Coordinates and implements White House conference and Federal agency recommendations on improved research participation at minority institutions. Initiates programs in support of minority math/science education.	Continues support of activities that will build alliances among minority educational institutions, professional organizations, foundations, and the public and private sectors. Continues the support of minority undergraduate training for energy-related careers (MUTEC). Completes support for the development of research Centers at selected minority educational institutions. Provides management and technical assistance in the design and implementation of improved research administration methods. Continues support of minority math/science education programs. (61,382)

III. Management and Technical Assistance (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Minority Educational Institution Assistance (Cont'd)		Expands efforts between Federal and industrial research laboratories that target minority elementary and secondary school children. Initiates a program to increase the number of minorities entering teaching careers in mathematics and the sciences. Develops activities in support of minority math/science education in major urban and poor rural school districts. (04,566)	
	$ 198	$ 4,566	$ 1,302
Minority Energy Information Clearinghouse	Continued to develop, collect and disseminate energy-related information which impacts minorities; focused on information requirements of users; and developed information retrieval systems for gathering and analyzing energy program information about the types and levels of participation of minority educational institutions, minority organizations and minority businesses in DOE program and activities. (60)	Continues to collect and disseminate relevant energy information, focusing on user information requirements, and improving the minority economic data base to generate user-specific subject bibliographies. Restructures the approach to information gathering and dissemination to maintain continuity both with HQ's educational and business programs and with Departmental program information. (0132)	Collects/disseminates to the widest degree possible among minority constituencies: (1) National Energy Goals and DOE policies; (2) economic development opportunities; and (3), provide sources for technical assistance and program participation. Develops information on energy-related or Department administered economic opportunity/development initiatives impacting on or available to minority users, including business enterprises, minority educational institutions and other appropriate minority organizations and individuals. Meets energy-related or Department administered economic opportunity information needs of the minority community through proactive information services and programs. (036)

III. Management and Technical Assistance (Cont'd):

Program Activity	FY 1989	FY 1990	FY 1991
Minority Energy Information Clearinghouse (Cont'd)	$ 0	$ 133	$ 36
Minority Business and Community Development	Provided economic development and technical assistance to energy-related minority business enterprises focusing on hi-tech business requirements. Coordinated information, management training, and financial processing with the NJ Minority Energy Information Clearinghouse, to achieve effective utilization of the technical information by the minority business community. (0)	Develops a program of focused technical assistance to minority business enterprises through structured workshops on proposal writing, creative marketing strategies, and technical options for establishing viable business organizations in the energy industry. Utilize the labor market analysis and prototype program strategies developed for New York City area to implement feasible entrepreneurship skills program of business education and management assistance programs. (513)	Extend prototype program for entrepreneurs to other regions and cities. Expand the energy-related technology base by establishing a formal network to link public and private sources of funding with technical expertise at minority educational institutions. Coordinate this task with available Clearinghouse services by maintaining a registry of high technology minority business firms and relevant opportunities within the energy industry. (824)
	$ 0	$ 513	$ 824
Management and Technical Assistance	$ 600	$ 5,629	$ 2,013

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

FINANCIAL ASSISTANCE

I. Preface: Financial Assistance

The Bank Deposit Financial Assistance Program provides short-term deposits in minority-owned financial institutions. Under DOE's Minority Bank Deposit Financial Assistance Program, non-appropriated funds obtained through consent decrees with major energy companies are deposited in short-term Certificates of Deposit in minority financial institutions, which use the funds to make loans and investments in minority communities.

OSI's Financial Assistance Program provides loans to minority businesses and minority enterprises to enhance their potential to participate in opportunities within DOE and the energy environment. Minority communities also become beneficiaries of these programs through the multiplier effect of increased economic activity. Appropriate financial assistance is needed in the technology-intensive markets of the energy industry to assist the disadvantaged to survive the competitive challenges of the industry. Focused marketing strategies must also be implemented to assist these communities.

II. A. Summary Table: Financial Assistance

Program Activity	FY 1989 Actual		FY 1990 Estimate		FY 1991 Request		% Change
Bank Deposit Financial Assistance	$	0	$	0	$	0	0
Business Loan Program		0		0		0	0
Total, Financial Assistance	$	0	$	0	$	0	0

1597

III. Activity Descriptions: (Row BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Financial Assistance			
Bank Deposit Financial Assistance	Maintained the Bank Deposit Program. Continued to place the program on the Federal Reserve's Automated Clearinghouse System for automatic collection of interest earned on deposits. Continued to increase the level of participation within the constraints imposed by the current number of Administrative Financial Institutions (FAI)	Continue to maintain the Bank Deposit Program. Continues to increase the number of financial institutions from 140 to 150 and to increase the level of funding deposited in the program from $30 million to $250 million. (80)	Maintains program strategies by which the public will benefit from increased funds obtained from interest earned by DOE on the funds deposited in the minority financial institutions. Funds will ultimately be returned to the U.S. Treasury. The administrative funds provide a large and stable deposit base upon which the participating financial institutions can earn a profit. The minority communities which are served by the minority financial institutions can benefit from the increased economic activity facilitated by such deposits. (80)
	$ 0	$ 0	$ 0
Business Loan Program	Implement the approved changes to the Bid/Proposal Preparation Loan Program lending terms and increase lending volume (80). Obtain authority for Venture and Working Capital Loan Programs for "establishing and expanding MBEs." (80)	Effectively restructure program from direct Federal loans for bid proposal-preparation in the contract process, to short chapitalization opportunities for minority entrepreneurial enterprises which hold promise in achieving national energy goals, providing more stable method by which to assist minority businesses. Advance national energy goals while assisting minority economic and business development. (80)	Identify representative minority business/economic enterprises. Categorize as to range of business services provided. Identify/prioritize business/economic development needs. Identify most promising means of assisting these enterprises, with emphasis on those contributing to the achievement of national energy goals. Define proactive economic development program which most effectively meets the mandates of Section 211(e), and the identified needs of the country's minority business community. (80)
	$ 0	$ 0	$ 0
Financial Assistance	$ 0	$ 0	$ 0

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

PROGRAM DIRECTION

I. Preface: Program Direction

The MI organization is responsible for advising the Secretary of Energy on the impact of national energy policies, programs and regulations affecting minorities, minority educational institutions, and minority business enterprises to insure that minorities are afforded the opportunity to participate fully in the energy programs of the Department. To support this program, which has diverse functional areas, a minimum of 11 FTEs will be required.

II. A. Summary Table: Program Direction

Program Activity	FY 1989 Actual		FY 1990 Estimate		FY 1991 Request		% Change
Program Direction	9	602	9	674	9	616	- 9
Total, Program Direction	9	602	9	674	9	616	- 9

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Program Direction	$602 provides for operating expenses needed for 10 full-time equivalent staff positions. ($602)	$676 provides for operating expenses required for 12 full-time equivalent staff positions. ($676)	$616 will be needed for operating expenses to support 11 full-time equivalent staff positions. ($616)
	11.0 FTE $ 602	11.0 FTE $ 674	11.0 FTE $ 616
Program Direction	11.0 FTE $ 602	11.0 FTE $ 674	11.0 FTE $ 616

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF MINORITY ECONOMIC IMPACT
(Obligations dollars in thousands)

OBJECT CLASS SUMMARY

Office of Minority Economic Impact

Direct Funding:		FY 1989	FY 1990	FY 1991
11.1	Full-time permanent	390	435	403
11.3	Other than full-time	118	139	104
11.5	Other Compensation	-	-	-
11.9	Total personnel compensation	508	574	507
12.1	Benefits	73	75	75
21.0	Travel	21	22	31
23.1	Rental Payments to GSA	-	-	-
23.2	Rental Payments to Others	-	-	-
25.0	Other Services	-	3	3
31.0	Equipment	-	-	-
32.0	Land & Structure	-	-	-
99.0	Subtotal	602	674	616
	Reimbursables	0	0	0
Totals		602	674	616

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
Departmental Administration
Overview

Policy, Planning and Analysis

The Office of Policy, Planning and Analysis (PE) reports to the Office of the Secretary and serves as its principal staff advisor, for formulating and recommending national energy policy. The Office is responsible for analyzing DOE policies and programs to ensure their consistency with national energy policy. The Office maintains a capability for: (a) analyzing and evaluating energy market conditions, (b) developing strategic policy planning, (c) developing consistent and clearly articulated policy options, (d) developing long-term energy projections, and (e) coordinating energy-related policy analysis conducted within the Department of Energy and elsewhere within the Executive Branch, to ensure consistency between energy goals and policy. PE provides economic and policy analysis support to DOE Program Assistant Secretaries, and carries out research, studies, analyses and assessments mandated by Congress or the Administration.

The structural framework within which PE operates derives from the Department's enabling legislation (Atomic energy Act, Non-Nuclear R&D Act, DOE Organization Act) and from the Administration's National Energy Policy Plan. The major goals for PE are: early and accurate identification of major energy policy issues that need to be addressed through long-term studies and analyses; continued development, analyses and evaluation of specific policies and programs in response to Congressional and Administration mandates, and in fulfillment of Departmental responsibilities; program research and long-term studies of the nature, causes and potential for solution of the Nation's energy and environmental problems; and analysis of the costs and benefits of programs designed to improve the Nation's energy balance.

The Nation's energy security and long range energy strategy are principal concerns of national energy policy development. The immediate objective is to ensure adequate energy supplies produced and used in a manner consistent with national economic, environmental and security goals, and to undertake basic and applied research and development of technologies that contribute to a diversified and efficient energy mix. To this end, PE monitors a wide range of indicators such as oil import levels, OPEC and Persian Gulf producers' market shares, expanding demands placed on world energy supplies by developing countries, hydrocarbon exploration, development and production activities in the U.S. and abroad, volatility of energy markets and resulting impacts on U.S. energy security, the emergence of alternative fuels, environmental and global climate change trends, the need to adjust government regulations to allow market incentives to work, and conservation and renewable energy technology applications. In addition, PE assesses specific issues, such as natural gas markets, fuel-flexible transportation systems, the impact of energy prices on efficiency investments, greenhouse gas emissions, regulatory reform in the electricity, natural gas, and petroleum markets, strategic petroleum requirements, and transportation fuel economy options that enhance the long-term security of the U.S.

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The FY 1991 budget request for PE is $9,301. This budget request assures a continuation of PE's ability to perform specific functions in areas critical to the continued implementation of the Administration's energy policy, and fulfillment of Congressional mandates, and PE's ability to provide acceptable levels of policy analysis and evaluation and energy policy planning support to the Congress, the Administration, the Office of the Secretary, and Program Assistant Secretaries. It supports new initiatives related to the NES, alternative fuels, environmental issues such as global warming and other fossil fuel concerns, and support for greater oversight review of the integration of energy policy development with available Departmental resources.

Policy Studies

The FY 1991 budget request for policy studies is $4,300.

This request will finance short- and long-term studies and analyses of a discrete set of major policy issues. Results from these studies are essential building blocks for the development of energy policy.

A broad range of short- and long-term studies and analyses will be conducted in FY 1991. These studies will provide objective, independent data and analyses relating to current energy issues, strategic energy planning, consistency and integration of energy policies. The short-term analytical requirements mandated by Congress, the Administration, and the Office of the Secretary will continue to receive the highest priority in the allocation of PE's resources. In addition to short- and long-term studies, efforts will be directed toward the continuous monitoring, analyzing and forecasting of the Nation's energy markets, and the effects of economic policy change and technology on these markets.

The major analytical task to be continued in FY 1991 is the completion of the initial National Energy Strategy (NES). The NES will guide the U.S. in achieving ample supplies of competitively priced energy in a manner sensitive to the environment, security, and health needs of the American public. The NES will serve as a blueprint for energy policy and program decisions. This strategy will chart the course, set the pace, and provide mileposts by which to evaluate progress in providing the energy the economy needs, while protecting the Nation's health, safety, and environment. When completed, this strategy will contain specific short-term, medium-term, and long-term recommendations, and will be updated on an annual basis. Other analytical tasks to be undertaken or continued in FY 1991 include: fuel efficiency cost/benefits to the year 2010, analysis of natural gas, oil pipeline, electric competition and regulatory reform issues, oil pipeline and analysis of alternative fuels policy options. Tasks will also determine the technical potential and cost-effectiveness of conservation/efficiency policy options that will have an effect on global climate change, air quality and waste issues on the energy industry, energy technology forecasting; economic analysis of conservation options and the tax competitiveness of production costs for energy fuels; energy supply and demand balances; analysis and review of energy security policy, integrated long-range energy strategy planning; analysis necessary for Congressionally mandated reports and studies; and support of Secretarial policy initiatives.

Program Direction

The FY 1991 request for program direction is $5,001. This funding requests provides salaries, benefits, training, and travel expenses for 89 FTEs.

This budget request is commensurate with PE's responsibilities under its Mission Statement. It provides staffing resources to perform PE's specific functions in areas critical to the continued research and development of national energy policy, and fulfillment of Congressional mandates; and to provide acceptable levels of policy analysis, evaluation and energy policy planning support to the Congress, the Administration, the Office of the Secretary, and Program Assistant Secretaries. It supports new initiatives related to the NES, alternative fuels, environmental issue such as global climate change and other fossil fuel concerns, and support for greater oversight review of the integration of energy policy development with available Departmental resources.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
Departmental Administration
(dollars in thousands)

SUMMARY OF CHANGES

Policy, Planning and Analysis

FY 1990 Appropriation	$8,579
Increase in Policy Studies and Program Direction	+ 722
FY 1991 Congressional Request	$9,301

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Department of Energy
FY 1991 CONGRESSIONAL REQUEST
Departmental Administration
(dollars in thousands)

Lead Table

Activity	FY 1989	FY 1990[1]	FY 1991 Base	FY 1991 Request	Program Request Vs Base Dollars	Change Base Percent
Policy Studies	$ 2,757	$ 4,198	$ 4,300	$ 4,300	--	--
Program Direction	2,969	4,381	5,001	5,001	--	--
Subtotal	$ 5,726	$ 8,579	$ 9,301	$ 9,301	--	--
Use of Unobligated Balance	+495	-2,430	--	--	--	--
Budget Authority	$ 6,221	$ 6,149	$ 9,301	$ 9,301	--	--
Staff Level	52	75	75	75		

[1] FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and P.L. 101-164 reductions to fund anti-drug activities.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
Departmental Administration
(dollars in thousands)

KEY ACTIVITY SUMMARY
Policy, Planning and Analysis

I. Preface: Policy, Planning and Analysis

The Office of Policy, Planning and Analysis (PE) reports to the Office of the Secretary. PE is the principal staff advisor to the Secretary and Deputy Secretary for formulating and recommending national energy policy. PE carries out analyses of DOE programs to ensure consistency with national energy policy. The Office provides the Secretary and Deputy Secretary with the capability for strategic long-range energy planning, energy-related policy oversight and analysis, and coordinates policy issues within the Department of Energy and the Executive Branch. PE further provides policy and economic analysis support to DOE Program Assistant Secretaries, and carries out studies mandated by Congress and the Administration. The Office has the lead responsibility for the development of the National Energy Strategy and for tracking and monitoring its implementation.

II. Summary Table:	FY 1989	FY 1990	FY 1991	$ Change
Policy Studies	$2,757	$4,198	$4,300	+ 2%
Program Direction	2,969	4,381	5,001	+ 14%
III. Major Laboratory and Facility Funding				
Argonne National Laboratory	$ 833	750	731	- 3%
Brookhaven National Laboratory	15	125	116	- 8%
Lawrence Berekely Laboratory	230	600	612	+ 2%
Oak Ridge National Laboratory	465	525	516	- 2%
Oak Ridge Associated Universities	100	500	500	100%
Pacific Northwest Laboratory	322	700	817	+ 16%

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III. Activity Description:

Program Activity	FY 1989	FY 1990	FY 1991
Policy Analysis	**NATIONAL ENERGY STRATEGY DEVELOPMENT ISSUES** Commenced development of Congressionally mandated National Energy Strategy (NES) and associated implementation strategies. Provided the lead analytical and staff support to the Secretary for NES development, coordinated input from all DOE program offices, and organized and directed the public consultations process. **TRANSPORTATION FUEL ISSUES** Conducted studies mandated by the Alternative Motor Fuels Act of 1988. Provided staff and analytical support to the Interagency Commission and to the U.S. Advisory Council on Alternative Fuels. Completed DOE Assessment of alternative fuels costs and benefits and released five reports on DOE analyses of this issue. Coordinated the intergovernmental development process for alternative fuels policy. Continued on-going analysis of fuel efficiency technical and economic potential for 1995 and 2000 and issued analysis reports. Participated in intergovernmental regulatory actions and reform on Corporate Average Fuel Economy Standards (CAFE). Developed fuel efficiency policy options for the NEPP.	Anticipate and plan for new initiatives of Congress, the Administration, the Secretary, Deputy Secretary, and Program Assistant Secretaries. Continue the lead responsibility for the NES. The NES preliminary draft will be prepared by April 1990. Undertake policy options analyses and cost effectiveness studies on issues comprising final set of NES recommendations. Perform analyses and evaluations of short-and long-range national and international strategic energy issues. Actively participate in the development and coordination necessary to enhance national energy policy by analyzing and recommending policies that reduce U.S. vulnerability to supply disruption, ensure external energy supplies, maintain a viable domestic oil/gas industry, facilitate coal output/usage, promote a safe/necessary nuclear industry, ensure continued reliable/adequate electricity, foster conservation and renewable fuels efforts, balance environmental concerns, plan for the integration of new technology into existing structures, and promote the U.S. energy	Anticipate and plan for new initiatives of Congress, the Administration, the Secretary, Deputy Secretary, and Program Assistant Secretaries. Complete NES and begin process/methodology for yearly update of the NES. Provide support to the Secretary in the development of legislative and regulatory proposals emanating from NES. Develop methodology for tracking progress of NES implementation. Perform analyses and evaluations of short-and long-range national and international strategic energy issues. Actively participate in the development and coordination necessary to enhance national energy policy by analyzing and recommending policies that reduce U.S. vulnerability to supply disruption, ensure external energy supplies, maintain a viable domestic oil/gas industry, facilitate coal output/usage, promote a safe/necessary nuclear industry, ensure continued reliable/adequate electricity, foster conservation and renewable fuels efforts, balance environmental concerns, plan for the integration of new technology into existing structures, and

III. Activity Description:

Program Activity	FY 1989	FY 1990	FY 1991
Policy Analysis	ENERGY CONSERVATION ISSUES Released results of analysis of Energy Conservation Trends in the U.S. economy, including estimates of past and projected conservation/efficiency achievements. Completed first phase analysis of Least Cost Utility Planning uncertainty and indicators of current and projected use. Completed initial analysis of technical and economic potential for electricity conservation to year 2000. Continued analysis of technical potential for oil conservation in each U.S. economic sector. ENERGY TRADE ISSUES Released initial findings of study to determine the role that energy plays in the competitive position of U.S. goods and services, including a comparison of energy consumption, intensity and efficiency among major trading partners of the U.S. OIL ISSUES Analyzed budget policy, including new financing methods, and the economic strategy of the use of the Strategic Petroleum Reserve (SPR) to minimize potential damage to the U.S. economy in the event of an oil supply disruption; developed model and analyzed financial incentives designed to encourage domestic oil	technology base. Provide analytical support on the Interagency Commission on Alternative Motor Fuels to develop a natural alternative fuels policy and to coordinate Federal activities which promote the use of alternative fuels in transportation. Continue assessment of energy supply/demand in less developed countries (LDCs) and of opportunities for knowledge and technology transfer. Compare U.S. R&D and technology transfer policies for energy technologies with those of major foreign countries and analyze the competitive implications. Determine role that energy plays in trade and competitiveness and compare U.S. and OECD energy consumption/efficiency/intensity indicators for their impact on trade advantage. Analyze and develop energy policies consistent with scientific developments in connection with global climate change and other international environmental concerns. Define maximum feasible level of cost-effective fuel efficiency and its effect on global warming. Examine impact of various fuel efficiency levels on oil conservation and on vehicle emissions. Participate in intergovernmental CAFE	promote the U.S. energy technology base. Support completion of studies mandated by the Alternative Motor Fuels Act of 1988. Undertake research and analyses mandated by the Interagency Commission and Advisory Council on Alternative Fuels. Continue assessment of energy supply/demand in less developed countries (LDCs) and of opportunities for knowledge and technology transfer. Complete comparative analyses of energy consumption/efficiency/intensity among U.S. major trading partners, and assess their impact on competitive trade. Analyze and develop energy policies consistent with scientific developments in connection with global climate change and other international environmental concerns. Continue research on maximum feasible technical and economic potential for auto/truck fuel efficiency in the post 1995 period. Continue research and analysis of energy conservation potential in each sector of the U.S. economy, by end-use and by fuel. Determine the technical potential and cost-effectiveness of conservation/efficiency policy options that will have an effect on greenhouse gas emissions. Continue analysis

III. Activity Description:

Program Activity	FY 1989	FY 1990	FY 1991
Policy Analysis	production; analyzed the Nation's need for oil and the importance of exploring and developing our most promising domestic oil and gas prospects including Alaska and offshore areas; analyzed benefits to the Nation's energy security of lifting restrictions on U.S. oil exports; analyzed current issues in U.S.-Canadian oil trade; monitored events in the international oil market and OPEC decisions and analyzed their affect on U.S. energy prices, economy and trade balance; analyzed various environmental issues--including Federal gasoline volatility standards, emission restrictions on refineries, production waste disposal--and their affect on the oil industry and product supplies; analyzed restrictions on the export to the USSR of U.S. oil and gas service equipment. Published OPEC and Lower Oil Prices, an analysis of the impact of lower oil prices on OPEC's oil production and export refining capacity, domestic demand and balance-of-payment scenarios and their effect on world oil trade. Analyzed the need for legislation to reform the regulation of oil pipelines, led an interagency task force to develop a consensus on oil pipeline legislation	rulemaking process. Continue to provide support to Secretary in DOE consultations with Federal departments, Congress, Local and State governments, and public and private interest groups. Coordinate development of national energy goals and strategies for their achievement. Analysis of the domestic refining situation and the industry's capability to meet growing demand for final products, given changes in the product mix, in specifications for products and in environmental restrictions on refinery construction and expansion; development of enhanced modeling capability to evaluate the affects of oil supply, demand and refining changes on world oil flows; analysis of several key factors affecting world petroleum supply and demand balances including OPEC production and pricing policy, increasing oil demand in developing countries and a review of non-OPEC oil resources. Commence second phase analysis of issues associated with Least Cost Utility Planning (LCUP). Refine and model data on most likely implementation of LCUP process. Continue analysis of uncertainty in electricity demand management and compare	of the movement of the natural gas and electric industries toward less regulated and more market driven decisionmaking, especially the impact of these developments on the reliability of energy supplies at the lowest reasonable price. ($4,300)

III. Activity Description:

Program Activity	FY 1989	FY 1990	FY 1991
Policy Analysis	culminating with the Administration sending new legislation to the Congress. Continued analysis of oil pipeline legislation, including sending the Administration's proposal on oil pipeline deregulation to the Congress. **NATURAL GAS ISSUES** Analyzed various Congressional proposals to deregulate natural gas wellhead prices and provided analytical support to the Secretary, Deputy Secretary and the White House to assist in arriving at an Administration position on numerous technical provisions in the bill that became the Natural Gas Wellhead Decontrol Act of 1989. Analyzed major new regulatory efforts by the Federal Energy Regulatory Commission (FERC) to respond to the DC Circuit's requirement that the FERC provide a rationale for not dealing with the take-or-pay problems more comprehensively. Analyzed the impact of the movement toward open access transportation, including the impact of relatively low wellhead prices on the reliability of the natural gas production and deliverability. Analyzed the impact of new FERC initiatives on gas inventory charges and other rate design proposals. Monitored the natural gas market in its transition from a heavily regulated to a more market driven industry.	with uncertainty in supply. Continue analysis of the technical and economic potential for increased energy conservation, and assess policy options that effect energy efficiency gains. Provide analytical support to Senior Officials in developing an regulatory and statutory agenda that allows gas to achieve its potential in meeting electric generation demands of the 1990's, displacing imports of oil, and meeting environmental goals. This includes analyzing the impact of certification requirements under the Natural Gas Act of 1938 (NGA) has on delaying or preventing new pipeline capacity from being built, the impact the Wellhead Decontrol Act of 1989 on FERC regulation of natural gas pipeline's merchant function, and the impact of rate design reform in encouraging the efficient utilization of pipeline and storage capacity. Continue to monitor the impact of low gas prices on the deliverability and production of natural gas and the impact on gas markets of moving from a heavily regulated to a more market driven industry. Analyze the impact of the proposed amendments to the Administration's Clean Air Act amendments. Analyze Congressional proposals to	

III. Activity Description:

Program Activity	FY 1989	FY 1990	FY 1991
Policy Analysis	COAL ISSUES Focused on effects of varying oil prices and other factors affecting domestic/world output and usage, and identified barriers that inhibit expansion of markets. Continued focus on coal export potential and clean coal technology. ELECTRICITY ISSUES Analyzed the impact of the Administration's Clean Air Act Amendments, including the demand by the electric generation sector for coal and natural gas and the regulatory efficacy of the emissions trading proposal. Analyzed the adequacy of electric capacity in the Northeast and the impact on electric reliability for that region of the Shoreham and the Seabrook plants not being brought into operation. Analyzed the impact of FERC proposals to allow competitive bidding in the electric generation sector and the impact on electric reliability, competition and fuel choice decisions. Monitored the electric market as new proposals are made to promote market driven decisions in the generation and transmission sectors. TECHNOLOGY ISSUES Review the Department's R&D activities base in order to factor major technology developments into energy supply and demand requirements over the short-and long-range. OTHER ISSUES Analyzed and developed energy policies consistent with scientific developments in connection with global climate change and other international environmental concerns. ($2,767)	reform the Public Utility Holding Company Act (PUCHA) to allow independent producers of electricity easier access into the generation market and to reform the Public Utility Regulatory Policies Act to allow market incentives for electricity generation and transmission; to impose additional requirements for least cost planning for gas and electric utilities to ameliorate global warming trends. Continue to monitor the issue of the adequacy of electric supply in the North-east and other proposals to move the electric industry toward a more market drive industry. ($4,198)	

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III. Activity Description:

Program Activity	FY 1989	FY 1990	FY 1991
Program Direction	The Office of Policy Planning and Analysis (PE) reports to the Office of the Secretary. Its primary function is to provide analytical and economic advise to the Secretary and Deputy Secretary and assist in the formulation of national energy policy. PE is responsible for strategic long-range planning, assessment and integration of energy policies options, and conduct analyses of DOE program policies to ensure coherence and integration with national energy policy. The Office provided the Secretary and Deputy Secretary with an objective policy analysis and evaluation capability, coordination of energy policy planning conducted within the DOE and the Executive Branch. PE provided policy and economic analysis support to the DOE Program Assistant Secretaries, and conducted studies mandated by Congress. ($2,969)	Enhancing the primary function of the Office (Advisor for national energy policy) by supporting the Secretary, Deputy Secretary and Program Assistant Secretaries through expanded emphasis on an integrated oversight review of policy issues in relation to program-budget trends and priorities, clarification of emerging trends, new developments, complex interrelationships, the benefits of strategic long-range planning for future energy needs and policy implementation concerns. Coordinate the development of national energy goals and strategies. Support completion of studies required for the National Energy Strategy and mandated by the 1988 Alternative Motor Fuels Act. Analyze policy options defined by the Interagency Commission on Alternative Motor Fuels and provide staff and analytical support to the Alternative Motor Fuels Advisory Council. Review/coordinate energy policy issues relating to electric power generation, clean air technology and global climate change. Cost benefits achieved through intensive efforts to balance the expense of policy studies against the results achieved. Productivity will continue to increase by ensuring present	Maintains critical review of functions to determine ones that best meet, at an acceptable level, the needs of the Congress, the Administration, and DOE Program Assistant Secretaries. Provide support for an integrated policy, program and budget review that follows the priorities established by the on-going NES implementation and tracking efforts. Provide manpower resources to perform specific functions in areas critical to the continued research and development of national energy policy, and fulfillment of Congressional mandates; and to provide acceptable levels of policy analysis, evaluation and energy policy planning support to the Congress, the President, Secretary, Deputy Secretary and Program Assistant Secretaries. Completion and submission to Congress policy development reports mandated by the Alternative Motor Fuels Act of 1988 and other legislative and Administration requirements. Determination of the technical potential and cost-effectiveness of conservation/efficiency policy options that will have an effect on global climate change issues; analysis of the domestic refining situation and the

III. Activity Description:

Program Activity	FY 1989	FY 1990	FY 1991
Program Direction		and new staff are fully trained on available analytical tools and economic models, on currently available office automation systems, and through planned upgrades to existing automated office system support to be provided by MA. ($4,381)	industry's capability to meet growing demand for final products, given changes in the product mix, in specifications for products and in environmental restrictions on domestic refinery construction and expansion. Analyze several key factors affecting world petroleum supply and demand balances including OPEC production and pricing policy increasing oil demand in developing countries and a review of non-OPEC oil resources; continue research on maximum feasible, technical and potential for auto/truck fuel efficiency in the post 1995 period; participation in the CAFE rulemaking process; and development and analysis of the regulatory and related environmental issues contributing to uncertainty in the electric utility/power generation industries. Maintains major emphasis on staff productivity, and reliance on contractor support for studies used to develop policy recommendations. ($5,001)
Total	($5,726)	($8,579)	($9,301)

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Department of Energy
FY 1991 CONGRESSIONAL BUDGET REQUEST
Departmental Administration
(Obligations in thousands of dollars)
Object Class

Policy, Planning and Analysis

Direct Funding		FY 1989	FY 1990	FY 1991
11.1	Full-Time Permanent	$ 2,059	$ 3,230	$ 3,847
11.3	Other than Full-Time	300	200	200
11.5	Other Compensation	105	200	200
11.9	Total Personnel Compensation	2,464	3,633	4,247
12.1	Benefits	416	633	660
21.0	Travel	74	102	76
25.0	Other Services	2,772	4,214	4,318
99.0	Totals	$ 5,726	$ 8,479	$ 9,301

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION

OVERVIEW

CONGRESSIONAL AND INTERGOVERNMENTAL AFFAIRS

The Office of Congressional and Intergovernmental Affairs (CP) is responsible for developing, managing and ensuring coordination of Departmental relations with the Congress; state and local officials; other Federal agencies; and consumer and business organizations. This Office is responsible for articulating the Secretary's National energy policy. We will dedicate our resources to ensure that clear and concise information is provided to the Congress as well as other public sector officials that should be involved and participate in achieving these goals. The offices that comprise Congressional and Intergovermental Affairs will be responsible for serving as an intermediary with other officials in the states to obtain support and expertise to significantly increase public awareness of energy programs and to assure the public of the Department's major objectives to make environmental, safety and health concerns a significate part of DOE's agenda. During FY 1991, our goals will be to continue to serve and establish a closer working relationship with the Congress and to monitor state and local governments, business and industry energy initiatives.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

LEAD TABLE

Congressional and Intergovernmental Affairs

Activity	FY 1989	FY 1990 1/	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
Congressional and Intergovernmental Affairs (CP)						
Salaries & Expenses	$ 4,037	$ 4,285	$ 4,285	$ 3,780	$ - 505	- 12%
Consumer Affairs	34	64	64	45	- 19	- 30%
Competition	--	49	49	--	- 49	-100%
Indian Affairs	309	--	--	--	--	
Subtotal, Congressional and Intergovernmental Affairs	$ 4,380	$ 4,398	$ 4,398	$ 3,825	$ - 573	- 13%
Use of Prior Year Unobligated Balances	- 796	-1,079	--	--		
Total, Congressional and Intergovernmental Affairs	$ 3,584	$ 3,319	$ 4,398	$ 3,825	$ - 573	- 13%
Staffing Total, FTE's*	76	69	69	69		

Authorization: Sections 102, 103, 203, 301, 655, and 801 - P.L. 95-91

*Excludes 2 FTE's included in the Civilian Radioactive Waste Management Office budget.

1/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and P.L. 101-164 reductions to fund anti-drug activities.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

SUMMARY OF CHANGES

Congressional and Intergovernmental Affairs

FY 1990 Obligation/FY 1991 Base	$ 4,398
Salaries and Expenses	
-- Provides for personnel compensation and benefits to support 69 FTE's	- 505
Consumer Affairs	
-- Reduced contractual support for consumer news programs	- 19
Competition	
-- Eliminates contractual support	- 49
FY 1991 Congressional Budget Request	$ 3,825

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

Congressional and Intergovernmental Affairs

I. Preface: Congressional and Intergovernmental Affairs

Congressional and Intergovernmental Affairs has primary authority for providing Departmentwide oversight of DOE's liaison activities with the Congress, state and local governments, private organizations, and consumers. The office will work with outside groups to obtain their support and expertise to improve DOE's ability to respond to the Nation's national security and energy needs. In addition, the office will also promote the interests of consumers and analyze energy competition among parties engaged in the supply of energy and fuels.

II. A. Summary Table

Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Salaries and Expenses	$ 4,037	$ 4,285	$ 3,780	- 12%
Consumer Affairs	34	64	45	- 30%
Competition	--	49	--	-100%
Indian Affairs	309	--	--	
Total, Congressional and Intergovernmental Affairs	$ 4,380	$ 4,398	$ 3,825	- 13%

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Salaries & Expenses	Facilitated the passage of legislation to decontrol wellhead natural gas prices. Continued to work with Congress on proposed legislation and/or participated in hearings on the uranium enrichment enterprise; reauthorization of the Strategic Petroleum Reserve Authority (EPCA Title I); nuclear licensing reform; possible future divestiture of the Naval Petroleum Reserves; funding of the construction for the Superconducting Super Collider; safety oversight at DOE nuclear facilities; renewable energy technologies; resolving DOE Defense Program issues (SIS, WIPP, etc.); and implementing the President's clean air program.	Continues level of effort for added responsibilities of the Secretary's intent to coordinate a centralized system in working more aggressively with the Congress. Ensure the Department's initiatives and goals are effectively relayed to the Congress and facilitate improved communication by providing advance, timely information on sensitive matters to avoid conflicts and misunderstanding.	Staff resources will provide for a central point of contact for liaison and information to Members of Congress and their staffs to present and advocate the Administration's position on energy-related legislative matters and National Energy Strategy with outside groups.
		Transfers functions for coordination and clearance of testimony by program offices and OMB. Provides for inserts for the record of hearings and questions and answers (Q's & A's) to be presented to Congressional committees.	Staff resources will be dedicated to the coordination and clearance of testimony and Q's and A's.
	Monitored and prepared reports and analysis to inform senior DOE officials about state energy legislation, issues and concerns.	Provides staff to perform activities to initiate liaison with state and local governments and to provide information on the initiatives underway and/or proposed by the Department.	Staff resources will be monitoring state and local governments' energy initiatives and serving as a central point of contact for the Department.

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Salaries & Expenses (Con't)	Monitored consumer public interest groups' initiatives and responded to inquiries on policies & programs. Prepared monthly Public Service Announcements for approximately 5,000 radio stations. Prepared 12 radio shows for 135 stations in 35 states.	Provides staff to ensure that consumers and consumer public interest groups, industry, labor and trade associations are informed of major initiatives undertaken on Departmental priorities. Begin to work with businesses and civic and energy-oriented groups in a proactive role.	Continues FY 1990 level of effort of maintaining working relationships with various groups on highly sensitive programs on which consumers have particular concerns.
	Consulted with industry, labor, education and trade associations on DOE issues, policies and programs.	Continues FY 1989 level of activities with businesses and industries to encourage their participation in the problem solving of major environmental and safety issues confronting the Department.	Continues FY 1990 level of effort to ensure major businesses in energy areas are involved at either Federal or State level in our major National Energy Strategy planning.
	Prepared competitive analyses on issues such as gasoline marketing, patent policy, effects of rail deregulation on coal transportation, etc.	Continues FY 1989 level of effort.	Continues FY 1990 level of effort to analyze competition in the energy industry.
Total OP Salaries and Expenses	$4,037 76 FTE's	$4,286 69 FTE's	$3,780 69 FTE's

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Consumer Affairs	Produced monthly public service announcements for distribution to 5000 radio stations nationwide. Produce a total of 12 radio programs on DOE policy and programs for reproduction and distribution to 135 radio stations in 35 states. Distribution of by-line consumer news programs. ($34)	Continues FY 1989 contractual support. ($64)	Provides the contractual support for producing public service announcements and radio programs. ($45)
Competition	Coordinates and directs analyses on the competitive impact of DOE's actions and policies in the energy industry. ($-0-)	Continues FY 1989 contractual support. ($49)	Eliminates contractual support. ($-0-)
Total CP Contractual Support	$34	$113	$45

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(Obligations in thousands of dollars)

OBJECT CLASS SUMMARY

Congressional and Intergovernmental Affairs

Direct Funding:		FY 1989	FY 1990	FY 1991
11.1	Full-time permanent	$ 2,397	$ 2,658	$ 2,375
11.3	Other than full-time permanent	1,005	957	728
11.5	Other compensation	106	100	100
11.9	Total, personnel compensation	$ 3,508	$ 3,715	$ 3,203
12.1	Benefits	479	500	505
21.0	Travel	49	69	70
	Subtotal, Direct Funding	$ 4,036	$ 4,284	$ 3,778
25.0	Other Services:			
	- Contractual Support:			
	o Consumer Affairs	34	64	45
	o Competition	--	49	--
	o Indian Affairs	309	--	--
	Subtotal, Contractual Support	$ 343	$ 113	$ 45
	- Training	1	1	2
	Total, Other Services	$ 344	$ 114	$ 47
	Total, Direct Funding	$ 4,380	$ 4,398	$ 3,825

DEPARTMENT OF ENERGY
FY 1991 OMB BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION

OVERVIEW

PUBLIC AFFAIRS

The Office of Public Affairs (PA) is responsible for managing and ensuring coordination of Departmental relations with the news media and the general public. This Office is also responsible for articulating the Secretary's new direction for the Nation's energy policy in a single, focused voice with the news media in terms of press services and public information activities. The Office will be responsible for serving as an intermediary with the news media and general public to significantly increase public awareness of energy programs and to ensure the public of the Department's major initiatives to keep them informed at all times.

26-657 O—90—61

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

LEAD TABLE

Public Affairs

Activity	FY 1989	FY 1990 1/	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
Public Affairs (PA)						
Salaries & Expenses	$ 1,407	$ 2,155	$ 2,155	$ 1,314	$ - 841	-39%
Public Affairs	41	266	266	42	- 224	-84%
Subtotal, Public Affairs	$ 1,448	$ 2,421	$ 2,421	$ 1,356	$-1,065	-44%
Use of Prior Year Unobligated Balances	--	- 776	--	--	--	
Total, Public Affairs	$ 1,448	$ 1,645	$ 2,421	$ 1,356	$-1,065	-44%
Staffing Total, FTE's	26	22	22	22		

Authorization: Sections 203 and 301 - P.L. 95-91

1/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and P.L. 101-164 reductions to fund anti-drug activities.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

SUMMARY OF CHANGES

Public Affairs

FY 1990 Obligation/FY 1991 Base	$ 2,421
Salaries and Expenses	
-- Provides for personnel compensation and benefits to support 22 FTE's	- 841
Public Affairs	
-- Eliminates contractual support for on-site support; evaluation program for audiovisual products and publications; archives of press releases; and a computerized system for distribution of press releases	- 224
FY 1991 Congressional Budget Request	$ 1,356

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

Public Affairs

I. Preface: Public Affairs

The Office of Public Affairs establishes DOE policy and procedures for conducting relations with the news media both routinely and during emergencies and provides daily guidance to all Departmental elements on news media activities and interests involving the Department's programs and policies. This Office also manages the overall public affairs program, including review and approval of the Department's publications, exhibits and audiovisual products planned for general distribution.

II. A. Summary Table

Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Salaries and Expenses.....	$ 1,407	$ 2,155	$ 1,314	- 39%
Public Affairs.....	41	266	42	- 84%
Total, Public Affairs.....	$ 1,448	$ 2,421	$ 1,356	- 44%

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Salaries & Expenses	Arranged more than 250 press conferences, interviews, editorial boards, etc.; prepared and issued press releases, fact sheets, speeches relating to critical national and departmental programs including Superconducting Super Collider, acid rain, clean coal technology, international oil supply, and nuclear safety and weapons production. Provided daily press liaison with the White House and Congress. Coordinated press activities with Federal agencies, interagency task forces and international organizations.	Staff resources will be utilized to publicly promote the Department's programs such as the National Energy Strategy, environmental and safety issues at DOE reactors, and inform the general public with information as the Department moves to change its management and safety of its nuclear facilities.	Continues FY 1990 level of effort.
	Prepared speeches, talking points, and articles for the Secretary and senior officials; coordinated special events and public affairs activities Departmentwide; reviewed, coordinated and managed all audiovisuals, exhibits and publications prepared by the Department elements and contractors; prepared and distributed daily newsclips to senior staff; operated a public inquiries service and published DOE monthly newspaper.	Staff resources will provide for management of audiovisuals, exhibits, and publications.	Continues FY 1990 level of effort.
Total, PA Salaries and Expenses	$1,407 26 FTE's	$2,155 22 FTE's	$1,314 22 FTE's

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Public Affairs:			
-- Press Office	Monitor radio and TV news; provide transcripts; and transmit news releases to major news bureaus.	Continues FY 1989 press office contractual support.	Provides for the transmittal of press releases to major news bureaus.
-- Public Affairs	Delivery of newspapers for use in preparing the daily newsclips; provide videotape duplication and editing services for all elements of the Department as needed and other public affairs support.	Continues FY 1989 public affairs contractual support.	Provides for the purchase of newspapers for use in preparing the daily newsclips.
Total, PA Contractual Support	$41	$266	$42

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(Obligations in thousands of dollars)

OBJECT CLASS SUMMARY

Public Affairs

Direct Funding:		FY 1989	FY 1990	FY 1991
11.1	Full-time permanent	$ 975	$ 799	$ 495
11.3	Other than full-time permanent	206	900	523
11.5	Other compensation	37	50	35
11.9	Total, personnel compensation	$ 1,218	$ 1,749	$ 1,053
12.1	Benefits	164	305	160
21.0	Travel	24	100	100
	Subtotal, Direct Funding	$ 1,406	$ 2,154	$ 1,313
25.0	Other Services:			
	- Contractual Support:			
	o Public Affairs	41	266	42
	- Training	1	1	1
	Total, Other Services	$ 42	$ 267	$ 43
	Total, Direct Funding	$ 1,448	$ 2,421	$ 1,356

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION

OVERVIEW

INTERNATIONAL AFFAIRS

The 1987 Energy Security report recognizes the overall international energy policy goal is to "maintain a stable and secure world energy environment, recognizing the interdependence as well as the independence of nations and the need to accommodate (or bolster, whenever possible) broader national security interests." The Department of Energy Organization Act of 1977 (P.L. 95-91) requests the Department to develop and implement international energy policy consistent with domestic energy and U.S. foreign policy and to provide independent technical advice to the President on international energy-related matters. This general mandate is based upon the importance of international influences on the energy program and the importance of energy as a component of foreign policy.

The Office of International Affairs is responsible for: developing international energy policy and associated energy R&D policy, including the international component of overall energy policy; developing, managing, and directing programs and activities that implement and support international energy policy and U.S. foreign policy; analyzing and monitoring world energy markets and energy trade; developing Department positions for international negotiations; developing, negotiating, implementing and assessing U.S. international nonproliferation policies; maintaining relationships with foreign governments and energy organizations; supporting international energy organizations; developing, negotiating and administering a program of technical exchanges and collaborative research and development with foreign governments including foreign participation in major DOE facilities.

1601

FY 1989 accomplishments include:

- Continued the leadership of the international aspects of the Superconducting Super Collider program aimed at obtaining the maximum foreign participation in this major scientific facility. Facilitated a new quadripartite activity involving the U.S., Japan, the European Communities and the Soviet Union on the conceptual design of an engineering-scale fusion test reactor. Developed new Nuclear Safety Memorandum of Cooperation with the USSR, and arranged for extension of the Agreement for Cooperation in the Peaceful Uses of Atomic Energy.

- Continued development of improved systems for processing subsequent arrangements. Prepared major analyses for the transfer of irradiated power reactor fuel from Switzerland to EURATOM for reprocessing. Coordinated DOE support for the IAEA, including recruitment of U.S. nationals into IAEA positions. Administered arrangements for technical operations directed toward improvement of the effectiveness of U.S. support of the IAEA, which arrangements are funded by the State Department of an annual level on the order $6 million. Coordinated with ACDA to continue funding of the RERTR Program at Argonne National Laboratory (1.56 million dollars transferred to DOE).

- Conducted bilateral energy discussions with Mexico, Venezuela, Canada, Japan, Korea,Saudi Arabia, United Arab Emirates, Qatar and Norway. Provided an analytical base for policy decisions by closely following the international energy supply policies of major oil producing and consuming governments and international oil markets, including spot markets, pricing trends, patterns of sale, and movements of crude oil. Led the U.S. Government's formal consultations with Canada on natural gas trade.

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Objectives for FY 1990 to FY 1995

1) Continue to support DOE's international R&D efforts by developing, coordinating, and completing agreements for cooperation, and improving management of the international R&D agreement process; 2) Implement the international plan to obtain maximum foreign participation in the SSC program, and prepare and negotiate the appropriate international agreements; 3) Continue to coordinate inter-agency activities and the government/industry interface relative to nuclear safety cooperation with and assistance to the USSR and its allies; 4) Continue to support the quadrupartite conceptual design studies related to the next generation of large devices in magnetic fusion and high energy physics research; coordinate development of foreign collaboration; 5) Implement new policies and management information systems for management and analysis of DOE-funded foreign travel and of visits and assignments to DOE facilities by foreign nationals; 6) Maintain and strengthen the Department's commitment to improvement of the international nuclear nonproliferation regime through programs designed to improve the effectiveness of the IAEA's safeguards and other programs; 7) Provide technical assistance to the Department of State in efforts to conclude negotiations and enter into a new Agreement for Nuclear Cooperation with European Atomic Energy Community (EURATOM); 8) Continue intensive efforts to gain universal accession to the Nuclear Nonproliferation Treaty, including support to the NPT Review Conference; 9) Manage the Reduced Enrichment Research and Test Reactors (RERTR) program which is having a continuing significant impact on the reduction of international traffic in highly enriched uranium (HEU); 10) Promote secure international energy trade by conducting analyses and developing policy initiatives in international coal, natural gas, and electricity; 11) Provide international leadership to promote exports of coal and clean coal technology; 12) Promote the free market in bilateral and multilateral energy relations through, for example, the removal of trade barriers; 13) Analyze political, economic and energy developments and trends in international markets in order to identify emerging issues which will effect U.S. international energy security interests; 14) Promote enhanced cooperation and a more intensive energy policy dialogue to increase prospects for greater U.S. oil and gas technical services exports; 15) Continue informal technical exchanges with key producing and consuming nations in order to promote understandings regarding our respective national energy policies.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

LEAD TABLE

International Affairs

Activity	FY 1989	FY 1990 *2	FY 1991 Base	FY 1991 Request	Program Change Request vs Base Dollar	Program Change Request vs Base Percent
International Policy Studies .	$ 830	$ 999	$ 999	$1,359	$+ 359	+36%
*1 (Reduced Enrichment Research and Test Reactors).				(300)	(+ 300)	
Program Direction.	3,477	4,112	4,112	3,700	- 417	-10%
Subtotal: Obligations	$4,307	$5,111	$5,111	$5,059	$- 58	0%
Less Use of Unobligated Balances	- 83	-1,062				
Total	$4,224	$4,049	$5,111	$5,059	$- 58	-1%
Staffing (FTEs)	51	51	51	51	0	0%

*1 Includes funds for managing the RERTR program. FY 1990 funds for this program amount to $1.1 million and are included in the Nuclear Energy R&D account.

*2 FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and PL 101-164 reductions to fund anti-drug activities.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

SUMMARY OF CHANGES

International Affairs

FY 1990 Appropriation	$4,049
Adjustments - Use of Unobligated Balances	1,062
FY 1991 Base	$5,111
Program Direction	
- Decreases due to costs for one time relocation of overseas representatives in FY 1990	- 411
International Policy Studies	
- Increase for inflation	+ 59
- Increase for management of RERTR program	+ 300
FY 1991 OMB Budget Request	$5,059

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

INTERNATIONAL AFFAIRS

I. Preface: International Research and Development (R&D) Policy

International R&D Policy is responsible for coordinating the development of energy R&D cooperation with foreign governments. This program is responsible for (1) coordinating with various program and staff elements of DOE, the Department of State, and other U.S. agencies on international energy R&D matters; (2) recommending policies and approaches for cooperation with specific countries or international organizations in these areas; and (3) completing agreements for cooperation with these countries or organizations. It is responsible for coordinating all aspects of the Department's participation in the Nuclear Energy Agency (NEA) of the Organization for Economic Cooperation and Development (OECD), and the Committee for Research and Development (CRD) of the International Energy Agency (IEA), including formulating, coordinating and implementing a broad range of policies and programs that further U.S. interests. It has primary responsibility within the Department of Energy for: (1) coordination and control of visits and assignments by foreign nationals to DOE Headquarters, field contractor organizations, and facilities; and (2) management of all foreign travel of DOE Headquarters, field and contractor personnel. With the decision to proceed with the construction of the SSC, a major new responsibility was assumed, to coordinate, plan, develop and ultimately negotiate agreements for foreign participation in the design, supporting R&D, construction and operation of the accelerator. Another major new undertaking is the establishment of new energy R&D agreements with the FRG, France, and the USSR, and the update and renewal of agreements with the UK, Japan, EC and Israel.

II. A. Summary Table: International Research and Development Policy

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Salaries and Benefits.....	$1,159	$1,372	$1,233	- 10
Contracts.....	100	100	100	0
Total	$1,259	$1,472	$1,333	- 9
FTEs.....	17.0	17.0	17.0	

II. B. Major Laboratory and Facility Funding

None

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
R&D Agreements	In coordination with Program Offices, initiate and staff agreements for R&D cooperation and forward to foreign nations for review and comment. Handle all arrangements through signature. Implement international collaboration program for SSC R&D. Renegotiate US-USSR Atomic Energy Agreement (5.0 FTEs $341) ($30 Contacts)	Continued in FY 1990 Renegotiate US-USSR. New agreements with FRG, update with EC, Japan, Israel. Negotiate agreements with foreign participants in SSC. (5.0 FTEs $404) ($80 Contracts)	In FY 1991, new agreements with France & USSR. Update with UK. Continue to negotiate agreements for foreign participation in SSC. IA Budget Request supports 1 additional FTE for SSC (5.0 FTE's $363) ($80 Contracts)

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International R&D Policy (Cont'd)			
R&D Collaboration Policy Development	Continue to refine formal international policies on international R&D collaboration as recommended by the ERAB report and endorsed in the 1987 IEA Ministerial. Develop policies on international cooperation in global environmental issues and on technology transfer. (5.0 FTEs $341) ($50 Contracts)	Provide int'l policy options and complete formal DOE order dealing with international R&D agreements. Rationalize interagency views on technology transfer/ international cooperation. (5.0 FTEs $404)	Monitor the implementation of the DOE order dealing with R&D activities and initiate new policy development as related to global environment issues and on technology transfer. IA Budget supports one for global climate. (5.0 FTEs $363)

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International R&D Policy (Cont'd)			
Overseas Representatives	Continue to provide support to international R&D collaboration of overseas embassies and other international programs. Maintain liaison with State and NRC and provide real time communication (background materials, current issues). Support overseas reps and embassy science officers. (2.0 FTEs $136)	Continue in FY 1990 (2.0 FTEs $161)	Continues same level of effort in FY 1991. (2.0 FTEs $145)

1609

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International R&D Policy (Cont'd)			
Mutilateral Organizations	Support the participation of the Department in the Nuclear Energy Agency and the R&D Committee of the International Energy Agency. Prepare position papers and briefing package for DOE participation in the NEA Steering Committee and IEA/CRD. Participate in country reviews. (1.0 FTEs $69)	Continue as in FY 1989 (1.0 FTEs $81)	Continue as in FY 1989 (1.0 FTEs $72)

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International R&D Policy (Cont'd)			
Foreign Visits and Assignments	Manage visits and assignment requests from foreign nationals visiting DOE facilities by receiving and processing all requests. Issue and implement new order on visits and assignments. (2.0 FTEs $136)	Continue in FY 1990 Update and issue new order on visits and assignments. Develop automated V&A system; complete implementation of new (2.0 FTEs $161)	IA Budget Request supports 1 additional FTE for V&A (2.0 FTEs $145)

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International R&D Policy (Cont'd)			
Foreign Travel	Manage foreign travel and tracking system for Headquarters and field personnel for 5,000 travel requests. Monitor trip reports; prepare travel analyses for senior DOE officials. Develop automated foreign travel system. (2.0 FTEs $136) ($20 Contracts)	Continue in FY 1990 Implement automated foreign travel system. (2.0 FTEs $161) ($20 Contracts)	Continue in FY 1991 (2.0 FTEs $145) ($20 Contracts)
Total, International Research and Development Policy	(17 FTEs $1,159) ($100 Contracts)	(17 FTEs $1,372) ($100 Contracts)	(17 FTEs $1,233) ($100 Contracts)

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

INTERNATIONAL AFFAIRS

I. Preface: Nuclear Nonproliferation Policy

The Nuclear Nonproliferation Policy program carries out DOE's responsibilities in implementation of U.S. nuclear nonproliferation policy including: support for the work of the International Atomic Energy Agency (IAEA); negotiation of new international agreements for cooperation in the peaceful uses nuclear energy; and review and approval of "subsequent arrangements" under the Nuclear Nonproliferation Act and Atomic Energy Act. In addition, this area is responsible for coordinating major new international nuclear safety initiatives undertaken by the IAEA in response to the Chernobyl accident, DOE support to the Treaty on the Nonproliferation of Nuclear Weapons (NPT), and management of the Reduced Enrichment Research and Test Reactors (RERTR) Program thru FY 1993. The program coordinates these matters within DOE and with other Departments and Agencies including the Departments of State, Defense and Commerce and with the Arms Control and Disarmament Agency and the Nuclear Regulatory Commission.

II. A. Summary Table: Nuclear Nonproliferation Policy

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Salaries and Benefits.....	818	968	871	- 10
Contracts.....	230	400	700	+ 75
Total	$1,048	$1,368	$1,571	+ 15
FTEs.....	12.0	12.0	12.0	

II. B. Major Laboratory and Facility Funding
NONE

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Nuclear Nonproliferation Policy (Cont'd)			
Subsequent Arrangements	Analyze and process Subsequent arrangements (including retransfer and reprocessing of of spent fuel and recovery of uranium and plutonium. Complete over 60 cases involving DOE nuclear materials contracts and approvals for sensitive international nuclear transfers. Incorporate program to transfer manual records to computer based control system. Field successfully, inquiries Congress/public regarding sensitive cases. (2.0 FTEs $136) ($75 Contracts)	This base line, statutorily-mandated DOE function will continue. Several sensitive cases already are in preparation. Continue incorperation of manual records to a computer-based control system. Obtain interagency agreement of steps to continue implementing Fuel Movement Project. (2.0 FTEs $161) ($75 Contracts)	Continue to process requests, as required by the NNPA. Implement enhanced tracking system under newly-negotiated agreements for nuclear cooperation. Complete computer based tracking and recording system. Transfer existing manual records to data processing system. (2.0 FTEs $145) ($75 Contracts)

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Nuclear Nonproliferation Policy (Cont'd)			
International Atomic Energy Agency (IAEA) Support:			
A. Recruitment for IAEA Positions	Recruit U.S. nationals for IAEA positions. Plan and administer enhanced program for recruitment of U.S. nationals for key posts. Implement national recruitment system. Evaluate and place U.S. participants for over 300 IAEA technical programs. (1.5 FTEs $102) ($55 Contracts)	Completion of the enhanced program of IAEA support will require that rosters and schedules be fully automated. Expected new focus on environmental concerns and continued interest in safety and the fuel cycle will place demands on DOE to provide qualified experts. (1.5 FTE's $121) ($55 Contracts)	Continuing in 1991 (1.5 FTE's $109) ($55 Contracts)

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Nuclear Nonproliferation Policy (Cont'd)			
IAEA Support:			
B. Policy/Funding Support to IAEA	Focal point for DOE participation/support of IAEA programs. Coordinate interagency technical reviews of IAEA programs. Arrange participation (private sector, national labs, government) in support of IAEA technical activities. Administer funds from State Dept. for IAEA support in areas of training, fellowships, contributions in kind, safeguards, and other nonproliferation activities. (1.2 FTEs $82) ($70 Contracts)	President's commitment to strengthen IAEA will entail intensified DOE support of IAEA activities. New focus on environmental concerns and continued strong interest in safety, fuel cycle, and safeguards will require continuing IA interaction with DOE program offices in these areas. (1.2 FTE's $97) ($110 Contracts)	The IAEA role is in addressing global problems (safety, environment, safeguards, fuel cycle is broadening. It is expected that the number and type of IAEA assistance requests will grow. Management of these programs together with enhanced U.S. Dept. of State resources will involve increased responsibility for management and control. (1.2 FTE's $87) ($110 Contracts)

Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Nuclear Nonproliferation Policy (Cont'd)			
IAEA Support:			
C. IE participation in IAEA Meetings and Conferences	DOE will lead the U.S. delegation to the General Conference. IE participates at senior levels in Board of Governors meetings. Extensive preparation, advance planning, schedule and briefing papers are required as well as significant pre-meeting interagency consultation. IE participates in technical groups, e.g., Committee on Assurances of Supply. (1.7 FTEs $116) ($30 Contracts)	Continue support for IAEA General Conference and Board meetings. Coordinate DOE support for IAEA technical programs. Prepare for 1990 Non-Proliferation Review Conference (NPT) including the compilation of background material and analysis required for support of U.S. position at NPT Conference. (1.7 FTEs $137) ($30 Contracts)	In FY 1991 there will be increased-demand for international activities in the safety and security of nuclear supply. (1.7 FTEs $123) ($30 Contracts)

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Nuclear Nonproliferation Policy (Cont'd)			
International Agreements for Cooperation in Civil Uses of Nuclear Energy	Complete work on the U.S. nuclear agreements with Japan, and the Peoples Republic of China. Efforts continue at enhanced level on preparation of new nuclear agreements with Canada and Sweden will be completed and similar agreements with Finland nearly completed. (2.1 FTEs $143)	The agreement with Japan will require extensive interagency and Congressional review. Development of complex and detailed arrangements to implement the new agreement, including briefing and reports to Congress. After entry into force, IA remains principal responsibility for negotiating necessary administrative arrangements. (2.1 FTEs $170)	Accelerate work on negotiation of complex new nuclear agreements with Euratom, Korea, and others. Administer implementing arrangement with Australia, Japan, Canada, Sweden and China. (2.1 FTEs $153)
RERTR Program	Provided program direction, using funds transferred from ACDA to the RERTR program to complete testing of developed low enriched uranium (LEU) research reactor and to assist other countries in the conversion of their reactors.	Provided program direction to the RERTR program, to complete all R&D work on LEU fuels and to provide assistance to other countries for the conversion of their research reactors from the use of HEU to LEU fuels. ($1,100 Contracts to be transferred from NE's budget)	Limited assistance to the export licensing process and to other countries to assist them in conversions of research reactors. ($300 Contracts)

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Nuclear Nonproliferation Policy (Cont'd)			
Nonproliferation Policy Development, Meetings, Liaison, Legislative Support, Safeguards Support	Supporting DOE management in development of interagency position reflecting energy security interests in overall nonproliferation policy. Extensive preparation of briefing materials and action memoranda for overseas trips by DOE principals. Bilateral negotiation/discussion of nonproliferation matters, including travel. Liaison functions with other affected agencies including State, Defense, ACDA, Commerce, NRC. Significant pre-hearing preparation of materials (hearings on plutonium use, IAEA General Conference) Key Congressional inquiries and briefings on sensitive nuclear issues. Support and attendance at international safeguards meetings. (3.5 FTEs $239)	Continuing in FY 1990 (3.5 FTEs $282) ($130 Contracts)	Continuing in 1991 (3.5 FTEs $254) ($130 Contracts)
Total Nuclear Nonproliferation Policy	(12 FTEs $818) ($230 Contracts) 377	(12 FTEs $968) ($400 Contracts)	(12 FTEs $871) ($700 Contracts)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

INTERNATIONAL AFFAIRS

I. Preface: International Energy Analysis

International Energy Analysis is responsible for monitoring and analyzing world energy market developments and the international political, economic and strategic factors that influence these developments; providing policy recommendations on a wide range of international energy security issues; managing U.S./DOE participation in international organizations with consuming and producing nations; and ensuring the integration of factors that may arise into overall international energy policies and analyses.

The responsibilities of International Energy Analysis are carried out by two programs as described below:

Ia. Preface: International Energy Assessments

Energy Assessments is responsible for monitoring and analyzing world energy markets and trends, and the international, political, economic and strategic factors which influence these developments or trends. Included among these assessments are: world oil market conditions, petroleum stocks, natural gas security and market developments, electricity policy and energy/environmental interactions, and energy trade. This program is also responsible for monitoring and managing technical exchanges with key producing countries and in providing support for visits by foreign energy officials to DOE or visits by DOE officials to their counterparts overseas.

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IIA. A. Summary Table: International Energy Assessments

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Salaries and Benefits.....	$ 900	$1,065	$ 958	-10
Contracts.....	235	325	325	0
Total	$1,135	$1,390	$1,283	- 3
FTEs.....	13.2	13.2	13.2	

II.a B. Major Laboratory and Facility Funding

NONE

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IIIa. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International Energy Assessments			
Energy Market Trends	Analyze both energy trends and situations in key producing/consuming countries for development of US policies with respect to emerging energy issues. Analyze data on the current state of the oil market on a continuing basis. The results are passed up to advise senior management of price trends, stock status, contract arrangements. (2.0 FTEs $136) ($95 Contracts)	Continuing in FY 1989 Analyze and report energy development such as production, consumption, major projects, etc., of individual countries. The need for technical role in IEA and other fora increase. (2.0 FTEs $161) ($150 Contracts)	Continuing in FY 1990. Review and evaluate international oil supply/demand outlooks to identify trends or key problems. Analyze/monitor impact of changing oil prices on US supply/demand (2.0 FTEs $145) ($150 Contracts)

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IIIa. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International Energy Assessments (Cont'd)			
Foreign Visits U.S. and Abroad	Provide policy, program coordination for visits between senior US and foreign energy officials. Organize and prepare policy and other papers for Secretary's visits to Japam, China, South Korea, Paris, UK, and Canada, Middle East and other countries. Participate in preparation of material for visits by other U.S. officials overseas and for foreign officials visiting U.S., including those from Mexico, Venezuela, Japan, China, Norway, Canada and others. (2.0 FTEs $136)	Organize and prepare policy and other papers for overseas Secretarial visits. Participate in preparation of materials for visits by other US officials overseas and for foreign officials visiting the U.S. (2.0 FTEs $161)	Continuing as in FY 1990 (2.0 FTEs $145)

IIIa. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International Energy Assessments (Cont'd)			
Key Producer/Consumer Country Exchanges	Maintain and manage technical exchanges on energy with key producer/ consumer countries. Organize, prepare and lead ongoing semi-annual bilateral technical exchanges with Mexico and Venezuela. Assist in preparation and participate in Energy Consultative Mechanism with Canada. Organize, arrange and manage staff level technical meetings with Japan, China, Norway, Canada, UK, Venezuela, Gulf Cooperation Council and others. (2.5 FTEs $171) ($40 Contracts)	Organize, prepate and lead semi-annual bilateral technical exchanges with U.S.'s major energy producer countries. Organize arrange and manage staff level technical meetings with other key producer/consumer countries. (2.5 FTEs $202) ($40 Contracts)	Continuing as in FY 1990 (2.5 FTEs $182) ($40 Contracts)

IIIa. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International Energy Energy Assessments (Cont'd)			
Multilateral Negotiations/ Meetings on Energy Market and Energy Security	Prepare and participate in multilateral negotiations/meetings to promote U.S. policy goals and U.S. leadership in the international energy market. Participate in meetings of the IEA's Standing Group on Oil Markets and Ad Hoc Group on International Energy Relations, including preparation and persentation of various papers. Prepare testimony for Deputy Secretary on energy security and participate in preparation of speeches by senior energy officials. Participate in various NSC assessments relating to energy. (1.7 FTEs $117)	Continuing in FY 1989 (1.7 FTEs $138)	Continuing in FY 1990 with need for increasing technical input in multilateral meetings. (1.7 FTEs $123)

IIIa. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International Energy Assessments (Cont'd)			
Monitor Key Countries and Regions	Monitor and analyze energy, political, and economic developments in key countries and regions. Conduct various studies to identify and assess energy policies and changes there to in key producing countries, including those in the Persian Gulf, Mexico, Venezuela, North Africa, and USSR. Monitor on ongoing basis the energy supply/demand policies and programs of various countries in the third world, including Brazil, Argentina, India, the Caribbean, China, and the Pacific Basin. (3.0 FTEs $204) ($100 Contracts)	Conduct various studies to identify and assess energy policies in key producing countries. Monitor energy/supply demand policies of selected third world countries and the Western Hemisphere. Expand the number of country files for selected countries. Initiate analysis of LDC energy developments. (3.0 FTEs $242) ($135 Contracts)	Continuing in FY 1990 with emphasis on key producers and LDC's. (3.0 FTEs $218) ($135 Contracts)

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IIIa. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989		FY 1990	FY 1991
International Energy Assessments (Cont'd)				
International Trade Activities	Participate in and develop DOE position on various international trade activities to promote U.S. energy trade policies. Participate in meetings of the Trade Policy Review Group and Trade Policy Staff Committee to ensure coordination with U.S. energy trade policy, including inputs to key legislation affecting trade. Review various ERA proposed orders dealing with natural gas imports and povide international input. Review various FERC proposed regulations and eval uate implications on imported natural gas. (2.0 FTEs $136)		Develop and submit for interagency use extensive analysis on U.S. refiner trends and product imports. Participate in development of U.S. position for new trade rounds and in Mexico request to join GATT. Conduct pipeline rate design analyses for implications on trade. (2.0 FTEs $161)	Continuing in FY 1989. Activities will continue in FY 1990 with emphasis on development of U.S. position in multilateral trade negotiation and continuing discussions with Canada on energy trade issues. (2.0 FTEs $145)
Total International Energy Assessments	(13.2 FTEs $900) ($235 Contracts)	384	(13.2 FTEs $1,065) ($325 Contracts)	(13.2 FTEs $958) ($325 Contracts)

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Ib. Preface: International Energy Organizations and Policy Development

The International Energy Organizations and Policy Development program manages and coordinates the international aspects of DOE/U.S. participation in energy security programs. Specifically, this program develops, coordinates and implements policies related to U.S. participation in the IEA, the U.S. Economic Commission for Europe (UNECE), the European Community (EC), the Association of Southeast Asian Nations (ASEAN). The objective of this activity is to develop strategies for successfully influencing the policies and programs of these organizations and countries in ways that are compatible with U.S. international energy security policy. The realization of this objective requires that energy developments in these organizations and countries are continually monitored and analyzed for their effect on U.S. and allied energy security, that U.S. positions are well represented in regular meetings in these organizations and with these countries, and that high-level consultations involving the Secretary and other senior DOE officials are well supported.

IIb. A. Summary Table: International Energy Organizations and Policy Development

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Salaries and Benefits.....	$600	$710	$638	- 10
Contracts.....	265	175	234	+ 33
Total	$865	$885	$872	0
FTEs.....	8.8	8.8	8.8	0

IIb. B. Major Laboratory and Facility Funding

NONE

IIIb. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International Energy Organizations and Policy Development (Cont'd)			
Represent U.S. in International Energy Agency at the Governing Board (GB)	Develop policy positions and strategies; coordinate within DOE and with State, NSC, EPA, and OMB and participate in 6 GB meetings. Report on meetings and policy conclusions. Arrange substansive and logistical requirements for IEA Ministerial meeting and implement results. Monitor energy activities of 20 IEA member countries and of the European Community to develop U.S. policy toward the IEA. (2.0 FTEs $136)	Continuing implementation of IEA Ministerial decisions. (2.0 FTEs $161)	Continuing IEA Ministerial meeting (2.0 FTEs $145)

IIIb. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International Energy Organizations and Policy Development (Cont'd)			
Provide energy input to Summit meetings	Develop and coordinate energy policies and strategies for use by U.S. principals at Paris Summit (0.2 FTEs $14)	Continuing. (0.2 FTEs $16)	Continuing. (0.2 FTEs $14)
Maintain Records as Required by Voluntary Agreement of the IEA	As required by 10 CFR Section 209.24(a) DOE must procure transcription service for IEA meetings with industry participants. Four such meetings were covered. Transcripts are classified, purged and provided to the Public Reading Room. (0.1 FTEs $7) ($120 Contracts)	Continuing. (0.1 FTEs $8) ($55 Contracts)	Continuing. Also support allocation systems test (0.1 FTEs $7) ($114 Contracts)

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IIIb. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International Energy Organizations and Policy Development (Cont'd)			
Represent U.S. and DOE at the IEA Standing Group on Long-Term Cooperation (SLT)	Develop policy positions and strategies, prepare documentation and provide US/DOE policy and technical representation at 6 SLT meetings in Paris. Work program included publications of Annual Review of IEA countries' energy policies and programs, joint IEA/NEA study on Electricity Generating Costs, and report on Electricity end-use efficiency. On environment, contribute to IPCC by support of IEA/IPCC experts group meeting on modeling (April) and co-operate with OECD Group on Energy and Environment on joint studies on climate change and long-term impact of energy demand on environment. Complete update on IEA policies and prospects for natural gas. Coordinate in-depth annual IEA review of U.S. energy policy and programs including team visit to U.S. and U.S. defense in Paris. Serve as Rapporteur for in-depth review of Australia. (2.0 FTEs $136)	Continuing. Analysis of long-term energy security issues, including natural gas, energy pricing, trade barriers, conservation, environment, electricity and coal. Analysis also includes dependency in end-use sectors. (2.0 FTEs $161)	Continuing. (2.0 FTEs $145)

IIIb. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International Energy Organizations and Policy Development (Cont'd)			
Bilateral Energy Relations	Monitor Energy activities of about 30 countries and develop assessments for impact on bilateral relations. Provide protocol support for Secretary, Deputy Secretary, Under Secretary and ASIE for visits by foreign energy officials and visits to foreign countries. (1.5 FTEs $102) ($60 Contracts)	Continuing. (1.5 FTEs $121)	Continuing. (1.5 FTEs $109)

IIIb. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International Energy Organizations and Policy Development (Cont'd)			
International Electricity Policy	Research and analysis conducted to support U.S. policy to promote secure international energy trade in electricity. Studies include analysis of (1) implication on long-term development of alternatives to oil and gas (especially coal and nuclear) of increased European electricity trade in the short to medium term and (2) implications of increased East-West trade in electricity. (0.5 FTEs $35) ($85 Contracts)	Completion of Studies sponsored in FY 1987. Additional development of policy position on international trade in electricity and electric generating equipment and technology. (0.5 FTEs $41) ($75 Contracts)	Continuing. (0.5 FTEs $36) ($75 Contracts)

III b. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International Energy Organizations and Policy Development (Cont'd)			
Natural Gas Policy	Continue general policy studies; analysis of substitution of gas for nuclear power in Europe in light of restraints to nuclear development. (1.0 FTEs $68)	Analysis of regional gas developments; long-term effect of lower oil prices and changing environmental controls on international gas market. Develop computer model of European gas grid to provide vulnerability assessment. (1.0 FTEs $81) ($45 Contracts)	Extend gas market analysis beyond expiring of present supply contracts (to 2010). Develop assessment of market opportunities for U.S. firms to export gas-related equipment and technology (1.0 FTEs $73) ($45 Contracts)

IIIb. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1990
Global Climate Change		Additional support is needed to fund DOE participation in activities of the Intergovernmental Panel on Climate Change; to obtain contractor support for studies of legal, economic, financial and technology transfer issues in implementing a global climate convention; and to contribute to U.S. sponsorship of workshops on the climate change issue.	DOE contributes to the Second World Climate Conference (November 1990). Activities on global climate change are expected to accelerate following completion of the IPCC interim report in October 1990. President Bush has announced he expects the IPCC efforts will lead negotiation on a climate convention. DOE/IE will play a lead role in these negotiations. (0 FTEs $0)

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IIIb. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
International Energy Organizations and Policy Development (Cont'd)			
Coal Export Initiatives	Develop strategies with Departments of State and Commerce and other appropriate USG agencies and with FE and PE to implement Coal Export Initiatives. Refine implementation objectives and programs. (1.5 FTEs $102)	Continuing. (1.5 FTEs $121)	Continuing. (1.5 FTEs $109)
Total International Energy Organizations and Policy Development	(8.8 FTEs $600) ($265 Contracts)	(8.8 FTEs $710) ($175 Contracts)	(8.8 FTEs $638) ($234 Contracts)

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(obligations dollars in thousands)

OBJECT CLASS SUMMARY

International Affairs

Direct Funding:		FY 1989	FY 1990	FY 1991
11.1	Full-time permanent	$2,485	$2,537	$2,490
11.3	Other than full-time	70	127	78
11.5	Other Compensation	50	75	75
11.9	Total personnel Compensation	$2,605	$2,739	$2,643
12.1	Benefits	325	350	350
21.0	Travel	287	311	300
23.1	Rental Payments to GSA	0	0	0
23.2	Rental Payments to Other	0	0	0
25.0	Other Services*	1,090	1,711	1,766
31.0	Equipment	0	0	0
99.0	Subtotal	$4,307	$5,111	$5,059
	Reimbursables	0	0	0
Totals		$4,307	$5,117	$5,059
	* NA 02	$ 830	$ 999	$1,359
	WM	260	712	407
	Total 25.0	$1,090	$1,711	$1,7[illegible]

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

LEAD TABLE

Policy and Management - IE

Activity	FY 1989	FY 1990 *	FY 1991 Request	Program Change Request vs Base Dollar	Percent
Departmental Administration					
Policy & Management, IE Operating Expenses.	$1,321	$1,571	$1,000	$- 571	-36%
Staffing (FTES)	18	12	12		

* FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and PL 101-164 reductions to fund anti-drug activities.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

POLICY AND MANAGEMENT - IE

I. PREFACE: Office of the Assistant Secretary and Management Services Staff

Policy and Management includes the Office of the Assistant Secretary and the Office of Management Services Staff. The Office of Management Services Staff is responsible for document control and handling in specialized circumstances and establishment of policies and procedures, with emphasis on classified documents and materials which relate to classified activities. The administrative staff is also responsible for establishing and directing activities associated with recruitment and position management, including the IE Intern Program and career-ladder efforts. In addition, budget preparation and execution, procurement and contracts administration, and financial management responsibilities are assigned to the Management Office. Moreover, it also performs management analysis, special analytical projects on a variety of subjects, correspondence control, administration of personnel and training matters, and coordination of general administrative services support activities for International Affairs and Energy Emergencies.

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II. A. Summary Table:

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	
ASIE (FTE)	13	4	4	0
MSS (FTE)	8	8	8	0
FTE Totals	21	12	12	0
Salaries & Benefits	$1,141	$1,331	$ 820	-38
Travel	100	90	80	+11
Contracts	80	150	100	+33
Activity	$1,321	$1,571	$1,000	-36

II. B. Major Laboratory and Facility Funding

None

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Office of the Assistant and Principal Deputy Assistant Secretary FTE's	Provide Executive Direction, and policy guidance for all IE. (13.0 FTEs)	Reflects the loss of nine Schedule C special assistants. (4.0 FTEs)	Provide Executive Director and policy guidance for all IE programs. (4.0 FTEs)

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Office of Management	Provide clerical assistance to MSS. IE facilities management activities which cut across organizational lines including security, property inventory, space, moving, requisitions, etc. (1.0 FTEs)	Same as FY 1989 (1.0 FTEs)	Same as FY 1989 (1.0 FTEs)
	Provide personnel coordination for 135 IE employees. Includes training, recruiting, promotion, appraisals, review and coordination of classified document control and security requirements. (1.5 FTEs)	Same as FY 1989 (1.5 FTEs)	Same as FY 1989 (1.5 FTEs)

1641

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Office of Management FTE's (Cont'd)	Perform procurement management activities for IE contracts, projects, including AOP development, processing, reporting, Small Business coordinator, competition in contracting, unsolicited proposals, etc. Estimate 100 transactions.	Deletes procurement planning and execution monitoring functions.	Same as FY 1990
	(1.0 FTEs)	(.5 FTEs)	(.5 FTEs)
	Provides internal controls accounting, auditing, reports development for all IE funds, including payroll, travel, contracts, other services, etc. Approx. 530 travel transactions, 24	Same as FY 1989	Same as FY 1989
	(1.0 FTEs)	(1.0 FTEs)	(1.0 FTEs)

1642

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Office of Management FTE's	Develop budget, five year plans; conduct financial planning and analysis; coordinate GAO/IG. OGC activities; serve as Internal Control review contact.	Same as FY 1989	Perform budget formulation activities for IE.
	(1.0 FTEs)	(1.0 FTEs)	(1.0 FTEs)
	Provide correspondence control, Executive Secretariat functions, F.O.I. etc.	Same as FY 1989	Provide essential correspondence functions, F.O.I. etc.
	(1.0 FTEs)	(1.0 FTEs)	(1.0 FTEs)
	Provide mail sorting and distribution functions for IE. Provides for distribution and sorting of all State Department and other cables of classified nature.	Same as FY 1989	Provide distribution sorting of mail and cables.
	(2.0 FTEs)	(2.0 FTEs)	(2.0 FTEs)

1643

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Salaries and Benefits	Provides for salaries and benefits for 21 federal employees and part-time staff. ($1,141)	Provides salaries and benefits for 12 federal employees and part-time staff. ($1,331)	Provides for salries and benefits for 12 federal employees. ($820)
Travel	Essential travel for AS/PDI and MSS training only. ($100)	Decline due to lower anticipated travel requirements. ($90)	Anticipated travel ASIE/PDIE based on planned trips. ($80)

1644

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Contract Support	Provides for general support services, ADP systems for IE programs.	Support services and maintenance to ADP systems, plus cross-cut small contractual requirements.	Support services contract support for implementation of automated budget formulation, travel authorizations, etc. Slight increase for procedure improvements.
	($80)	($150)	($100)
Total	($1,321)	($1,571)	($1,000)

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(obligations dollars in thousands)

OBJECT CLASS SUMMARY

Policy and Management - IE

Direct Funding:		FY 1989	FY 1990	FY 1991
11.1	Full-time Permanent	$ 510	$ 590	$ 430
11.3	Other than full-time permanent	441	551	220
11.5	Other compensation	65	75	65
11.9	Total personnel compensation	$1,016	$1,216	$ 715
12.1	Personnel Benefits: Civilian	125	115	105
21.0	Travel	100	90	80
23.0	Rental Payments to GSA	0	0	0
25.0	Other Services	80	150	100
31.0	Equipment	0	0	0
32.0	Land & Structure	0	0	0
99.0	Subtotal	1,321	1,571	1,000
	Total Obligations	$1,321	$1,571	$1,000

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OVERVIEW

DEPARTMENTAL ADMINISTRATION

Cost of Work for Others

The Department's FY 1991 Budget Request for the Cost of Work for Others program is $116,131,000. This represents the current estimate of the costs to be incurred to provide non-DOE customers with products and services. The Cost of Work for Others program provides funding to the Department of Energy's multipurpose operations offices and national laboratories to finance the cost of work products and services requested by non-DOE customers, both foreign and domestic. The estimate also includes funding for General Purpose Equipment to be used in support of work performed for other Federal Agencies. The products and services provided by the Department under this program generally are not available from alternate sources. The costs of the Cost of Work for Others program are offset by revenues received from the sale of products and services to our customers.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET
ASSISTANT SECRETARY FOR MANAGEMENT AND ADMINISTRATION
DEPARTMENTAL ADMINISTRATION
LEAD TABLE

COST OF WORK FOR OTHERS
(DOLLARS IN THOUSANDS)

	FY 1989	FY 1990*	FY 1991 BASE	FY 1991 REQUEST	PROGRAM CHANGE REQUEST vs BASE DOLLAR	PROGRAM CHANGE REQUEST vs BASE PERCENT
COST OF WORK FOR OTHERS:						
PRODUCTS SOLD, OPERATING	$23,850	$21,693	$21,693	$16,258	($5,435)	-25%
SERVICES PERFORMED, OPERATING	$54,614	$61,162	$61,162	$74,873	$13,711	22%
GENERAL PURPOSE EQUIPMENT	$0	$0	$0	$25,000	$25,000	100%
SUBTOTAL, COST OF WORK FOR OTHERS	$78,464	$82,855	$82,855	$116,131	$33,276	40%
UNUSED UNOBLIGATED BALANCES	$37,098	--	--	--	--	--
TOTAL, COST OF WORK FOR OTHERS OPERATING	$115,562	$82,855	$82,855	$116,131	$33,276	40%

* FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and P.L. 101-164 reductions to fund anti-drug activities

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(Dollars in Thousands)

SUMMARY OF CHANGES

COST OF WORK FOR OTHERS

FY 1990 Appropriation	$ 82,855
o Increase for the purchase of General Purpose Equipment for Other Federal Agencies at the Department's National Laboratories	+25,000
o Foreign Government activity and Miscellaneous projects at ALO	+9,660
o Miscellaneous	-1,384
FY 1991 CONGRESSIONAL BUDGET REQUEST	$ 116,131

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
COST OF WORK FOR OTHERS
DEPARTMENTAL ADMINISTRATION
(DOLLARS IN THOUSANDS)

KEY ACTIVITY SUMMARY

PROGRAM ACTIVITY	FY 1989		FY 1990		FY 1991	
PRODUCTS SOLD	-Sale of special materials at ALO.	$6,273	-Sale of special materials at ALO.	$3,100	-Sale of special materials at ALO.	$7,000
	-Sale of miscellaneous products at Idaho Operations Office.	$133	-Sale of natural gas at Idaho.	$133	-Sale of natural gas at Idaho.	$200
	-Sales at Oak Ridge Operations	$1,400	-Sale of excess mercury at Oak Ridge.	$190	-Sale of excess mercury at Oak Ridge.	$600
	-Sales at Oak Ridge National Laboratory.	$9,732	-Sale at Oak Ridge National Laboratory	$6,066	-Sale of at Oak Ridge National Laboratory.	$0
	-Sale of timber at Savannah River.	$2,600	-Sale of timber at Savannah River.	$2,700	-Sale of timber at Savannah River.	$2,600
	-Sale of miscellaneous Products at ETEC, SFO.	$3,712	-Sale of miscellaneous products at ETEC, SFO.	$9,504	-Sale of miscellaneous products at ETEC, SFO.	$5,858
TOTAL, PRODUCTS SOLD		$23,850		$21,693		$16,258
SERVICES PERFORMED	-Activities including Hot Dry Rock project, Battelle Columbus Lab, Lockheed Missile & Space Co., Martin Marietta, NIH, and miscellaneous contracts at Albuquerque Operations Office.	$5,000	-Activities including Technology Transfer ($4.), NIA ($3.8), and miscellaneous activities ($5.8) at Albuquerque Operations.	$15,556	-Activities including Technology Transfer ($3.), NIH ($.8), and miscellaneous activities ($18.6) at Albuquerque Operations.	$22,360
	-Argonne contracts with EPRI, GRI, Univ of Chicago, Center for Research on Sulfer Coal and miscellaneous contracts.	$4,313	-Argonne contracts with EPRI ($2.), University of Chicago ($2.), Garrett Air Research($2.1), and miscellaneous contracts ($2.8).	$8,974	-Argonne contracts with EPRI ($1.7), University of Chicago ($3.1), Garrett Air Research($1.0), and miscellaneous contracts ($3.9).	$9,748
	-Reference material at New Brunswick National Laboratory.	$150	-Reference material at New Brunswick National Laboratory.	$150	-Reference material at New Brunswick National Laboratory.	$165
	-In-Reactor Source Term experiment at EPRI, GRI, Xerad Corp, NY State Sandia National Laboratory and miscellaneous at Brookhaven.	$7,491	-Miscellaneous contracts at Brookhaven National Laboratory.	$3,192	-Miscellaneous contracts at Brookhaven National Laboratory.	$11,517

DEPARTMENT OF ENERGY
Y 1991 CONGRESSIONAL BUDGET REQUEST
COST OF WORK FOR OTHERS
DEPARTMENTAL ADMINISTRATION
(DOLLARS IN THOUSANDS)

KEY ACTIVITY SUMMARY

PROGRAM ACTIVITY	FY 1989		FY 1990		FY 1991	
	-Solar Energy Research Institute and Fermilab at the Chicago Operations Office	$5,742	-Solar Energy Research Institute ($2.7), and Fermilab ($.6) at the Chicago Operations Office	$3,380	-Solar Energy Research Institute ($2.7), and Fermilab ($.6) and the PPPL ($.9) at the Chicago Operations Office	$5,717
	-Use of DOE-owned facilities, special services & fabrication, Geothermal Geopressure, Magnetohydrodynamics and misc contracts at Idaho Operations	$3,467	-Special services & fabrication ($.3), Biotechnology ($1.1), and miscellaneous contracts ($.8) at Idaho Operations Office	$2,157	-Special services & fabrication ($.3), Biotechnology ($.3), and miscellaneous contracts ($6.) at Idaho Operations Office	$6,650
	-Testing for the UK at Nevada	$0	-Testing for the UK at Nevada	$0	-Testing for the UK at Nevada	$0
	-Treated water, ORAU, and Y-12 at Oak Ridge Operations	$4,202	-ORAU ($1.0), ORGDP ($2.9), Y-12 ($.8), and misc ($.8) at Oak Ridge	$5,476	-ORAU ($1.3), ORGDP ($2.9), Y-12 ($.6),and misc ($4.4)at Oak Ridge	$8,757
	-Irradiation services & test reactor experiments, special services & fabrication, special preparation costs for isotopes, protective coating evaluation, EPRI, foreign organizations, universities, and miscellaneous contracts at Oak Ridge National Laboratory	$8,236	-Irradiation services & test reactor experiments ($.2), special services & fabrication ($.2), and other services at Oak Ridge National Laboratory	$3,022	-Irradiation services & test reactor experiments ($.4), special services & fabrication ($.5), and other services at Oak Ridge National Laboratory	$3,946
	-Westinghouse contracts and miscellaneous contracts at Richland Operations Office	$1,710	-Westinghouse contracts ($1.3), and miscellaneous contracts ($.8) at Richland Operations Office	$2,153	-Westinghouse contracts ($1.5), and miscellaneous contracts ($5.0) at Richland Operations Office	$6,540

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
COST OF WORK FOR OTHERS
DEPARTMENTAL ADMINISTRATION
(DOLLARS IN THOUSANDS)

KEY ACTIVITY SUMMARY

PROGRAM ACTIVITY	FY 1989		FY 1990		FY 1991	
	-Rockwell Intern'tl, SLAC, SCTI, miscellaneous contracts at SPO.	$3,993	-ETEC ($1.2), SLAC ($3.) at the San Francisco Operations Office.	$4,290	-ETEC ($3.0), SLAC ($4.2) at the San Francisco Operations Office.	$10,186
	-EPRI contract, GRI, University of CA, Pacific Gas & Elect, Computer Use and miscellaneous contracts at Lawrence Berkeley National Lab.	$8,700	-EPRI contract ($.8), GRI ($.7), California Utilities ($1.), Universities ($1.1), and miscellaneous contracts ($5.9) at Lawrence Berkeley.	$9,500	-EPRI contract ($.6), GRI ($.7), California Utilities ($1.), Universities ($1.7), and miscellaneous contracts ($6.) at Lawrence Berkeley.	$10,000
	-Gas Research Institute, Kelsius Corp and misc contracts at Lawrence Livermore.	$3,610	-Research for the Protection of Safety and Health ($.9) and misc. ($2.4) at Lawrence Livermore.	$3,312	-Research for the Protection of Safety and Health ($.9) and misc. ($3.4) at Lawrence Livermore.	$4,287
TOTAL, SERVICES PERFORMED		$54,614		$61,162		$99,873
UNUSED UNOBLIGATED BALANCES		$37,098		$0		$0
TOTAL, COST OF WORK FOR OTHERS		$115,562		$82,855		$110,131

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DEPARTMENTAL ADMINISTRATION

Revenues

The Department's FY 1991 estimated revenues of $-183,413,000 represent revenues from a $116,131,000 Cost of Work for Others program and from $-59,421,000 in other revenues not associated with Cost of Work for Others. Revenues of $-123,992,000 represent the full-cost recovery offset for Cost of Work for Others, the program associated with supplying products and services to our customers. In addition to the revenues received that are directly related to the Cost of Work for Others program, other revenues of $-59,421,000 are received from the sale of by-products that have no costs associated with the Departmental Administration appropriation. These items are incidental by-products of activities funded from other Departmental programs.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(DOLLARS IN THOUSANDS)

KEY ACTIVITY SUMMARY

REVENUES

PROGRAM ACTIVITY	FY 1989		FY 1990		FY 1991	
REVENUES ASSOCIATED WITH COST OF WORK						
PRODUCTS SOLD	-Sale of special materials at Albuquerque.	($7,437)	-Sale of special materials at Albuquerque.	($9,541)	-Sale of special materials at Albuquerque.	($9,157)
	-Sale of natural gas at Idaho.	($133)	-Sale of natural gas at Idaho.	($133)	-Sale of natural gas at Idaho.	($200)
	-Sale of excess mercury at Oak Ridge.	($2,450)	-Sale of excess mercury at Oak Ridge.	($190)	-Sale of excess mercury at Oak Ridge.	($1,050)
	-Sales at Oak Ridge National Laboratory.	($12,150)	-Sales at Oak Ridge National Laboratory.	($3,270)	-Sales at Oak Ridge National Laboratory.	$0
	-Sale of timber at Savannah River.	($2,400)	-Sale of timber at Savannah River.	($1,341)	-Sale of timber at Savannah River.	($2,900)
	-Sale of miscellaneous products at ETEC, San Francisco.	($3,963)	-Sale of miscellaneous products at ETEC, San Francisco.	($8,549)	-Sale of miscellaneous products at ETEC, San Francisco.	($5,858)
TOTAL, PRODUCTS SOLD		($28,533)		($23,024)		($18,765)
SERVICES PERFORMED	-Activities including Hot Dry Rock project, Battelle Columbus Lab., Lockheed Missile and Space Co., Martin Marietta Corporation, NIH, UK, and miscellaneous contracts at Albuquerque.	($5,900)	-Activities including Technology Transfer ($5.), NIA ($4.7), and miscellaneous contracts ($6.5) at Albuquerque Operations Office.	($18,568)	-Activities including Technology Transfer ($4.), NIH ($1.7), and miscellaneous contracts ($19.2) at Albuquerque Operations Office.	($24,927)
	-Argonne contracts with EPRI, GRI, University of Chicago, Center for Research on Sulfer Coal and miscellaneous contracts.	($5,293)	-Argonne contracts with EPRI ($2.), GRI (.4), Univ of Chicago ($2.), Garrett Air Research ($2.1), and miscellaneous contracts ($3.).	($8,504)	-Argonne contracts with EPRI ($2.), Univsity of Chicago ($3.5), Garrett Air Research ($1.5), and miscellaneous contracts ($3.).	($10,030)
	-Reference material at New Brunswick National Laboratory.	($184)	-Reference material at New Brunswick National Laboratory.	($150)	-Reference material at New Brunswick National Laboratory.	($145)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(Dollars in Thousands)

SUMMARY OF CHANGES

REVENUES

FY 1990 APPROPRIATION	$ 150,000
o Increase for the purchase of General Purpose Equipment for Other Federal Agencies at the Department's National Laboratories	+25,000
o Foreign Government activity and miscellaneous projects at ALO	+8,413
FY 1991 CONGRESSIONAL BUDGET REQUEST	$ 183,413

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(DOLLARS IN THOUSANDS)

KEY ACTIVITY SUMMARY

REVENUES

PROGRAM ACTIVITY	FY 1989		FY 1990		FY 1991	
REVENUES ASSOCIATED WITH COST OF WORK						
PRODUCTS SOLD	-Sale of special materials at Albuquerque.	($7,437)	-Sale of special materials at Albuquerque.	($9,541)	-Sale of special materials at Albuquerque.	($9,157)
	-Sale of natural gas at Idaho.	($133)	-Sale of natural gas at Idaho.	($133)	-Sale of natural gas at Idaho.	($200)
	-Sale of excess mercury at Oak Ridge.	($2,450)	-Sale of excess mercury at Oak Ridge.	($190)	-Sale of excess mercury at Oak Ridge.	($1,050)
	-Sales at Oak Ridge National Laboratory.	($12,150)	-Sales at Oak Ridge National Laboratory.	($3,270)	-Sales at Oak Ridge National Laboratory.	$0
	-Sale of timber at Savannah River.	($2,400)	-Sale of timber at Savannah River.	($1,341)	-Sale of timber at Savannah River.	($2,300)
	-Sale of miscellaneous products at ETEC, San Francisco.	($3,963)	-Sale of miscellaneous products at ETEC, San Francisco.	($8,549)	-Sale of miscellaneous products at ETEC, San Francisco.	($5,858)
TOTAL, PRODUCTS SOLD		($28,533)		($23,024)		($18,765)
SERVICES PERFORMED	-Activities including Hot Dry Rock project, Battelle Columbus Lab., Lockheed Missile and Space Co., Martin Marietta Corporation, NIH, UK, and miscellaneous contracts at Albuquerque.	($5,900)	-Activities including Technology Transfer ($5.), NIA ($4.7), and miscellaneous contracts ($6.5) at Albuquerque Operations Office.	($10,568)	-Activities including Technology Transfer ($4.), NIH ($1.7), and miscellaneous contracts ($19.2) at Albuquerque Operations Office.	($24,927)
	-Argonne contracts with EPRI, GRI, University of Chicago, Center for Research on Sulfer Coal and miscellaneous contracts.	($5,293)	-Argonne contracts with EPRI ($2.), GRI (.4), Univ of Chicago ($2.), Garrett Air Research ($2.1), and miscellaneous contracts ($3.).	($8,564)	-Argonne contracts with EPRI ($2.), University of Chicago ($3.5), Garrett Air Research ($1.5), and miscellaneous contracts ($3.).	($10,035)
	-Reference material at New Brunswick National Laboratory.	($184)	-Reference material at New Brunswick National Laboratory.	($150)	-Reference material at New Brunswick National Laboratory.	($165)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(DOLLARS IN THOUSANDS)

KEY ACTIVITY SUMMARY

REVENUES

PROGRAM ACTIVITY	FY 1989		FY 1990		FY 1991	
	-In-Reactor Source Term experiment at EPRI, GRI, Xerad Corporation, NY State, Sandia, and miscellaneous contracts at Brookhaven.	($7,793)	-Miscellaneous contracts at Brookhaven National Laboratory.	($2,534)	-Miscellaneous contracts at Brookhaven National Laboratory.	($11,547)
	-Midwest Inst Neutron Therapy & Loma Linda at FERMI.	($5,184)	-Solar Energy Research Institute ($2.8), and Fermilab ($.6) at the Chicago Operations Office.	($2,721)	-GERI ($2.8), and PPPL ($1.5) and Fermilab ($.6) at the Chicago Operations Office.	($5,905)
	-Use of DOE-owned facilities, special services & fabrication, Geothermal Geopressure, Magnetohydrodynamics and misc. contracts at Idaho Operations.	($6,533)	-Special services and Fabrication ($.3), Biotechnology ($1.4) and miscellaneous contracts ($.8) at the Idaho Operations Office.	($1,886)	-Special services and fabrication ($.3), Biotechnology ($.5) and miscellaneous contracts ($6.) at the Idaho Operations Office.	($6,831)
	-Testing for the UK at Nevada.	$0	-Testing for the UK at Nevada.	$0	-Testing for the UK at Nevada.	$0
	-Treated water, ORAU, and Y-12 at Oak Ridge Operations.	($4,418)	-Oak Ridge Gaseous Diffusion Plant ($2.9), ORAU ($.1), Y-12 ($.8) & misc. contracts ($.9) Oak Ridge.	($2,984)	-Oak Ridge Gaseous Diffusion Plant ($2.9), ORAU ($.4), Y-12 ($.8) & misc. contracts ($4.4) Oak Ridge	($9,477)
	-Irradiation services & test reactor experiments, special services & fabrication, special preparation costs for isotopes, protective coating evaluation, EPRI, foreign organizations, universities, and miscellaneous contracts at Oak Ridge National Laboratory.	($7,382)	-Irradiation services & test reactor experiments ($.3), special services and fabrication ($.3), and other services ($4.) at Oak Ridge National Laboratory.	($4,975)	-Irradiation services & test reactor experiments ($.4), special services and fabrication ($.6), and other services ($3.7) at Oak Ridge National Laboratory.	($4,024)
	-Westinghouse contracts, and miscellaneous contracts at Richland Operations Office.	($2,083)	-Westinghouse contracts ($1.3), and miscellaneous contracts ($.8) at Richland Operations Office.	($1,495)	-Westinghouse contracts ($1.6), and miscellaneous contracts ($5.4) at Richland Operations Office.	($6,996)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(DOLLARS IN THOUSANDS)

KEY ACTIVITY SUMMARY

REVENUES

PROGRAM ACTIVITY	FY 1989		FY 1990		FY 1991	
	-Rockwell Intern'tl, SLAC, SCTI, miscellaneous contracts at SFO.	($4,633)	-ETEC ($1.2) and SLAC ($3.5) at San Francisco Operations Office.	($4,296)	-ETEC ($3.0) and SLAC ($4.2) at San Francisco Operations Office.	($10,192)
	-EPRI contract, GRI, University of California, Pacific Gas and Electric, Computer Use and misc. contracts at Lawrence Berkeley National Laboratory.	($9,579)	-EPRI contract ($.8), GRI ($.7), California Utilities ($1.1), and miscellaneous contracts ($6.1) at Lawrence Berkeley National Laboratory.	($8,970)	-EPRI contract ($.8), GRI ($.7), California Utilities ($1.1), and miscellaneous contracts ($7.5) at Lawrence Berkeley National Laboratory.	($10,074)
	-Gas Research Inst, Kelsius Corp., and miscellaneous contracts at Lawrence Livermore National Lab.	($4,044)	-Research for the Protection of Safety and Health ($.9) and miscellaneous contracts at Lawrence Livermore National Laboratory.	($2,650)	-Research for the Protection of Safety and Health ($.9) and miscellaneous contracts at Lawrence Livermore National Laboratory.	($5,087)
TOTAL, SERVICES PERFORMED		($63,026)		($59,733)		($105,227)
TOTAL, REVENUES ASSOCIATED WITH COST OF WORK FOR OTHERS		($91,559)		($82,757)		($123,992)

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
DEPARTMENTAL ADMINISTRATION
(DOLLARS IN THOUSANDS)

KEY ACTIVITY SUMMARY

REVENUES

PROGRAM ACTIVITY	FY 1989		FY 1990		FY 1991	
MISCELLANEOUS REVENUES	-Reprocessing irradiated fuel at Idaho.	($52,400)	-Reprocessing irradiated fuel at Idaho.	($53,322)	-Reprocessing irradiated fuel at Idaho.	($30,135)
					-Revenues recoverred from the reimbursable program at ALO.	($2,556)
	-Fuel burn-up at Pittsburgh Naval Reactors.	($9,500)	-Fuel burn-up at Pittsburgh Naval Reactors.	($9,842)	-Fuel burn-up at Pittsburgh Naval Reactors.	($9,500)
					-Revenues recoverred from the reimbursable program at NVO.	($13,975)
	-Reprocessing domestic & foreign reactor fuels at Savannah River.	($3,000)	-Reprocessing domestic & foreign reactor fuels at Savannah River.	($3,000)	-Reprocessing domestic & foreign reactor fuels at Savannah River.	($3,055)
	-Miscellaneous revenues.	($1,236)	-Miscellaneous revenues.	($1,079)	-Miscellaneous revenues.	($200)
TOTAL, MISCELLANEOUS REVENUES		($66,136)		($67,243)		($59,421)
TOTAL, REVENUES		($157,695)		($150,000)		($183,413)

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VOLUME 4

INSPECTOR GENERAL

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF INSPECTOR GENERAL

PROPOSED APPROPRIATION LANGUAGE

For necessary expenses of the Office of the Inspector General in carrying out the provisions of the Inspector General Act of 1978, as amended, [$22,959,000] $28,421,000, to remain available until expended.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF INSPECTOR GENERAL

OVERVIEW

OFFICE OF INSPECTOR GENERAL

The purpose of the Office of Inspector General (OIG) is stated in Section 4 of Public Law 95-452, as amended, the Inspector General Act of 1978. Section 4(a) reads:

(a) It shall be the duty and responsibility of each Inspector General, with respect to the establishment within which his Office is established-

(1) to provide policy direction for and to conduct, supervise, and coordinate audits and investigations relating to the programs and operations of such establishment;

(2) to review existing and proposed legislation and regulations relating to programs and operations of such establishment and to make recommendations in the semiannual reports required by section 5(a) concerning the impact of such legislation or regulations on the economy and efficiency in the administration of programs and operations administered or financed by such establishment or the prevention and detection of fraud and abuse in such programs and operations;

(3) to recommend policies for, and to conduct, supervise, or coordinate other activities carried out or financed by such establishment for the purpose of promoting economy and efficiency in the administration of, or preventing and detecting fraud and abuse in, its programs and operations;

(4) to recommend policies for, and to conduct, supervise, or coordinate relationships between such establishment and other Federal agencies, State and local governmental agencies, and nongovernmental entities with respect to (A) all matters relating to the promotion of economy and efficiency in the administration of, or the prevention and detection of fraud and abuse in, programs and operations administered or financed by such establishment, or (B) the identification and prosecution of participants in such fraud or abuse; and

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(5) to keep the head of such establishment and the Congress fully and currently informed, by means of the reports required by section 5 and otherwise, concerning fraud and other serious problems, abuses, and deficiencies relating to the administration of programs and operations administered or financed by such establishment, to recommend corrective action concerning such problems, abuses, and deficiencies, and to report on the progress made in implementing such corrective action.

OFFICE OF AUDITS

The Office of Audits is responsible for the internal auditing of the Department of Energy. The mission includes performance audits, including economy and efficiency and program results, and financial audits including financial statements and financial-related activities. The audits are conducted in conformance with generally accepted Government auditing standards. The Office of Audits' goals are to: (1) cause improvements to be made in the economy, efficiency and effectiveness of DOE's operations, including the Secretary's 10-point program to move the Department toward full accountability in the areas of environment, safety and health; and (2) prevent and detect waste, fraud and mismanagement. The Office of Audits conducts independent evaluations of DOE's operating and administrative programs including an assessment of the Department's financial and management control systems and procedures. Recommendations are made to management to correct areas where improvements are needed.

The Office of Audits is committed to the following objectives: (1) to increase FTE strength to have sufficient Federal auditors for all performance audits (audits of program results and economy and efficiency); (2) to have a highly-trained, competent, innovative, mobile, performance-oriented, professional audit organization that is current with today's technology and is respected; (3) to provide to the DOE a full-scope, quality, service-oriented, cost-effective and well-balanced audit service that produces timely reports, meets legislative requirements, and meets the highest standards of the audit profession; (4) to have an audit and resource planning system that will effectively "target" projects and functions in need of audit; determine and demonstrate the amount of audit resources required to meet long- and short-term audit needs of the Department; direct audit resources to those subjects in greatest need of audit; (5) to effectively manage audits and evaluations done under contract; and, (6) to contribute to multi-agency audits, system development projects, and actively participate in activities sponsored by the President's Council on Integrity and Efficiency, The National Intergovernmental Audit Forum and like organizations.

OFFICE OF INVESTIGATIONS

The Office of Investigations performs the statutory investigative duties which relate to the promotion of economy and efficiency in the administration of, or the prevention or detection of fraud or abuse in, programs and operations of the Department. The major program objectives of the Office of Investigations for FY 1991 are as follows: (1) to dispose of allegations received by the Office of Inspector General either by determination that no further action is necessary, by referral to another government agency, by immediate referral to the Federal Bureau of Investigation, by referral to DOE management for inquiry, action and reply, or by investigation resulting in prosecutive or administrative action; (2) to place more emphasis on the development of significant contract procurement fraud cases involving the Department's programs and operations, environmental, health and safety issues, and the integrity of Departmental and contractor officials both at Headquarters and field sites; (3) to reduce case load by referring less significant allegations to DOE management for review and to focus on investigating criminal and serious administrative violations among DOE's programs and operations; (4) to continue making improvements in the investigative program by identifying wrongdoing by Departmental and/or contractor employees leading to conviction, monetary recovery and/or suspension/debarment; and, (5) to conduct more joint projects with the Offices of Audits and Inspections and Analysis, with respect to Departmental activities in procurement, Environment, Safety and Health, and Safeguards and Security.

OFFICE OF INSPECTIONS AND ANALYSIS

The Office of Inspections and Analysis provides independent and objective inspections and analyses of the effectiveness, efficiency, and economy of the programs and operations of the DOE. An inspection is an examination of a program, function or activity. The purpose of an inspection is to evaluate the effectiveness and/or efficiency of an operation; to determine compliance with laws and regulations; or to evaluate program results. An inspection is also another OIG technique used to detect or prevent fraud, waste or mismanagement. Inspections may provide more immediate and timely feedback to program managers and, in some instances, inspections may provide a source of analytical information for criminal investigations or audits. Efforts have been initiated and will continue to be on reviews of critical areas associated with Secretarial initiatives including Environment, Safety and Health, Safeguards and Security, intelligence, and management issues that impact the economy, efficiency and integrity of operations. Future activities will continue to emphasize reviews of the critical issues related to these areas.

In order to enhance the capabilities of the Office to focus more specifically on the strategic objectives of the OIG, four inspector positions are being reassigned to the field. Office of Inspections and Analysis personnel are to be assigned to Oak Ridge, TN; Savannah River, SC; Albuquerque, NM; and San Francisco, CA.

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF INSPECTOR GENERAL
(dollars in thousands)

LEAD TABLE

Office of Inspector General

Activity	FY 1989	FY 1990 1/	FY 1991 Base	FY 1991 Request	Program Request vs Base Dollar	Program Request vs Base Percent
FTP Salaries	$8,644	$10,985	$10,985	$11,923	$ +938	+9%
Other Compensation.....	381	474	474	493	+19	+4%
Benefits	1,580	2,280	2,280	2,552	+272	+12%
Travel	960	1,300	1,300	1,433	+133	+10%
Services	10,963	10,899	10,899	12,020	+1,121	+10%
Capital Equipment	---	---	---	---	---	---
Total.....	$22,528	$25,938	$25,938	$28,421	$+2,483	+10%
Operating Expenses ..	(22,528)	(25,938)	(25,938)	(28,421)	+2,483	+10%
Capital Equipment ...	(---)	(---)	(---)	(---)	---	---
Use of Unobligated Balances	-1,080	-3,300	---	---	---	---
Grand Total	$21,448	$22,638	$25,938	$28,421	+2,483	+10%
Staffing (FTEs)	189	240	240	256		

1/ FY 1990 reflects final Gramm-Rudman-Hollings sequester adjustments and P.L. 101-164 reductions to fund anti-drug activities.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF INSPECTOR GENERAL
(dollars in thousands)

SUMMARY OF CHANGES

Office of Inspector General

FY 1990 Appropriation	$22,638
Plus use of prior year unobligated balances	+3,300
FY 1991 Base	25,938
Increase Salaries and Benefits	+1,229
	27,167
Increase Travel	+133
	27,300
Increase Other Contractual Support Services	+1,121
FY 1991 Congressional Budget Request	$28,421

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
INSPECTOR GENERAL
(dollars in thousands)

KEY ACTIVITY SUMMARY

INSPECTOR GENERAL

I. Preface: Office of Audits

The Office of Audits is responsible for the internal auditing of the DOE. The mission includes performance audits, including economy and efficiency and program results, and financial audits, including financial statements and financial-related audits. The Office of Audits provides audit services for the agencies for which audit cognizance is assigned to DOE. It is estimated that the cost of this activity is approximately $150,000 per year.

II. A. Summary Table: Office of Audits

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Office of Audits	$ 16,756	$ 17,383	$ 18,120	+ 4
Total, Office of Audits	$ 16,756	$ 17,383	$ 18,120	+ 4

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III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Office of Audits	A total of 348 audit reports were published during FY 1989 with a total dollar impact of $636,923,282. The report recommendations, if implemented, would result in $21,036,830 in potential recoveries from DOE contractors and another $615,886,452 from more efficient use of Departmental resources or other improved management actions.	Refocus audit planning to provide increased emphasis on previously unaudited areas and additional coverage of areas of current DOE emphasis, e.g., Safeguards and Security; Environment, Safety and Health; and Nuclear Waste Disposal. As in FY 1989, the ability to refocus is limited by the required demands for procurement audits. A total of 375 audits are projected. The availability of contracted audit support will permit the conduct of audits in critical, high-priority areas.	Focus will be on performing required audits of grants and contracts and the requirements of the Federal Managers' Financial Integrity Act. This office will be able to respond to increasing requirements for required financial audits of contract preawards, incurred costs, closeouts, etc., which would otherwise be backlogged until audit resources become available. Resources will also be available for performance audits in Environment, Safety and Health, and other critical, high priority program areas such as Safeguards and Security, Nuclear Waste Disposal, Weapons Programs and the Superconducting Super Collider. A total of 375 audits are projected.
	106.0 FTE $ 16,756	128.0 FTE $ 17,383	128.0 FTE $ 18,120
Office of Audits	106.0 FTE $ 16,756	128.0 FTE $ 17,383	128.0 FTE $ 18,120

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
INSPECTOR GENERAL
(dollars in thousands)

KEY ACTIVITY SUMMARY

INSPECTOR GENERAL

I. Preface: Office of Investigations

The Office of Investigations performs the statutory investigative duties which relate to the promotion of economy and efficiency in the administration of, or the prevention or detection of fraud or abuse in, programs and operations of the Department.

II. A. Summary Table: Office of Investigations

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Office of Investigations	$ 2,574	$ 4,657	$ 4,448	- 4
Total, Office of Investigations	$ 2,574	$ 4,657	$ 4,448	- 4

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Office of Investigations	Based on FY 1989 results, the Office of Investigations processed 447 cases; referred 72 cases for prosecution, resulting in 13 convictions; referred 19 cases to management for corrective action; and 96 administrative referrals for management review. Investigative recoveries were $836,797. In FY 1989, emphasis was on development of criminal cases. This emphasis was reflected in more referrals of administrative matters to DOE management and the conduct of joint contract/procurement investigations with the Offices of Audits and/or Inspections and Analysis. Recommendations were made for corrective action on weaknesses of internal management controls.	Emphasis will be placed on the development of more complex criminal cases. With 25 additional FTEs, emphasis will be placed on contract/procurement cases, high risk environmental, safety and health cases and cases involving the integrity of Departmental and contractor officials both at Headquarters and field sites. Eighty percent of the 25 additional FTEs will be in the field locations where DOE spends the major portion of its budget on defense programs. Potential civil remedies against wrongdoing Departmental contractors will be fully pursued in joint projects with the Offices of Audits and/or Inspections and Analysis. Thus, while the number of cases being investigated may decrease, the cases will also cause Departmental programmatic and procedural changes through recommendations for corrective action. It is anticipated that the inventory of investigative cases will be about 10%.	Focus will continue on the development of more complex criminal cases with emphasis on significant contract/ procurement fraud cases, high risk environmental, safety and health cases, and cases involving the integrity of Departmental and contractor officials both at Headquarters and field sites. Emphasis will also be given to the undertaking of joint audit/investigative activities as a result of the "Government Auditing Standards" requirement that auditors are required to look for fraud. It is expected that the caseload will represent quality cases resulting in recommendations to program managers and referrals to prosecutive authorities. It is anticipated that the inventory of investigative cases will be about 10%.
	40.0 FTE $ 2,574	67.0 FTE $ 4,657	67.0 FTE $ 4,448
Office of Investigations	40.0 FTE $ 2,574	67.0 FTE $ 4,657	67.0 FTE $ 4,448

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DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
INSPECTOR GENERAL
(dollars in thousands)

KEY ACTIVITY SUMMARY

INSPECTOR GENERAL

I. Preface: Office of Inspections and Analysis

The Office of Inspections and Analysis (OIA&A) performs inspections and analyses to meet the strategic objectives of the Inspector General. An inspection is an examination of a program, project, function, activity or organization. The purpose of an inspection is to evaluate the effectiveness and/or the efficiency of an operation; to determine compliance with laws and regulations; or to evaluate program results. An inspection is also another technique used to detect or prevent fraud, waste, or mismanagement. Inspections may provide more immediate and timely feedback to program managers and, in some instances, provide a source of analytical information for audits or criminal investigations. Issues reviewed by this Office often have high visibility and frequently concern matters that have significant implications for management of the Department.

II. A. Summary Table: Office of Inspections and Analysis

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	$ Change
Office of Inspections and Analysis.....	$ 1,107	$ 1,461	$ 2,693	+ 84
Total, Office of Inspections and Analysis	$ 1,107	$ 1,461	$ 2,693	+ 84

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Office of Inspections and Analysis	Staff resources were used to review major DOE programs and projects. In addition, resources were committed to responding to hotline complaints, Congressional inquiries and DOE top management concerns. The Office focused its efforts on issues related to Environment, Safety and Health; Safeguards and Security; Intelligence; and, management issues related to economy, efficiency and integrity. OIA completed 30 inspection projects during FY 1989.	Staff resources will continue to be utilized to conduct reviews of major DOE programs and projects. Specifically, resources will be used to respond to specific hotline complaints, Congressional inquiries, and top level DOE management, as well as providing some technical support to other elements of the OIG. Emphasis will continue to be on reviews of critical areas associated with Environment, Safety, and Health; Safeguards and Security; Intelligence; and, management issues that impact economy, efficiency, and integrity of operations. It is anticipated that 30 inspection projects will be completed.	Additional staff resources will permit a significant increase in the number of reviews of major DOE programs, projects, and systems including DOE Operations Offices. A principal objective of these reviews will be to preclude waste before it occurs. Approximately four major program reviews could be completed. In addition, resources will be used to provide timely response to specific hot line complaints, Congressional inquiries, and top level DOE management, as well as providing some technical support to other OIG elements. Emphasis will continue to be on reviews of critical areas associated with Secretarial initiatives including Environment, Safety and Health; Safeguards and Security; Intelligence; and, management issues that impact economy, efficiency and integrity of operations. It is anticipated that 50 inspection projects will be completed.
	17.0 FTE $ 1,107	18.0 FTE $ 1,461	34.0 FTE $ 2,083
Office of Inspections and Analysis	17.0 FTE $ 1,107	18.0 FTE $ 1,461	34.0 FTE $ 2,083

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
INSPECTOR GENERAL
(dollars in thousands)

KEY ACTIVITY SUMMARY

INSPECTOR GENERAL

I. Preface: Program Management and Support

This staff provides executive direction and support to the OIG. It prepares, justifies and executes the budget; responds to Freedom of Information Act and Privacy Act requests, Congressional and media inquiries; provides legal counsel to the IG; conducts quality assurance reviews; provides management and technical support; and provides personnel and administrative support services to the OIG.

II. A. Summary Table: Program Management and Support

Program Activity	FY 1989 Actual	FY 1990 Estimate	FY 1991 Request	% Change
Program Management and Support.....	$ 2,091	$ 2,437	$ 3,160	+ 30
Total, Program Management and Support	$ 2,091	$ 2,437	$ 3,160	+ 30

III. Activity Descriptions: (New BA in thousands of dollars)

Program Activity	FY 1989	FY 1990	FY 1991
Program Management and Support	Provided executive direction and support to the OIG. Prepared, justified and executed the budget; responded to Freedom of Information Act and Privacy Act requests, congressional and media inquiries; provided legal counsel to the IG; provided management and technical support; provided personnel services to the OIG; and provided ADP and other administrative support services to the OIG.	Provide additional executive direction and support to the expanded OIG. Prepare, justify and execute the budget; respond to Freedom of Information Act and Privacy Act requests, congressional and media inquiries; provide legal counsel to the IG; provide management and technical support; provide personnel services to the OIG; and provide increased ADP and other administrative support services to the OIG.	Provide executive direction and support to the OIG. Prepare, justify and execute the budget; respond to Freedom of Information Act and Privacy Act requests, Congressional and media inquiries; provide legal counsel to the IG; conduct quality assurance reviews; provide management and technical support; provide personnel services to the OIG; and provide increased ADP and other administrative support services to the OIG.
	26.0 FTE $ 2,091	27.0 FTE $ 2,437	27.0 FTE $ 3,160
Program Management and Support	26.0 FTE $ 2,091	27.0 FTE $ 2,437	27.0 FTE $ 3,160

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF INSPECTOR GENERAL
(dollars in thousands)

KEY ACTIVITY SUMMARY

OFFICE OF INSPECTOR GENERAL

II. Summary Table:

Program Activity	FY 1989	FY 1990	FY 1991	% Change
FTP Salaries	$ 8,644	$10,985	$11,923	+9%
Other Compensation	381	474	493	+4%
Benefits	1,580	2,280	2,552	+12%
Travel	960	1,300	1,433	+10%
Services	10,963	10,899	12,020	+10%
Contract Audits (including DCAA)	(9,442)	(8,869)	(8,976)	(+1%)
	115 SY	100 SY	101 SY	
Other Contractual Services	(1,521)	(2,030)	(3,044)	(+50%)
Capital Equipment	---	---	---	---
Total, Inspector General	$22,528	$25,938	$28,421	+10%

CONGRESSIONAL BUDGET REQUEST

FY 1991

FEDERAL ENERGY REGULATORY COMMISSION

U.S. DEPARTMENT OF ENERGY

JANUARY 1990

(1677)

Federal Energy Regulatory Commission
FY 1991 Congressional Budget Request

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Federal Energy Regulatory Commission
FY 1991 Congressional Budget Request

Summary of Programs

Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars).

	FY 1989 Actual	FY 1990 Appropriation 1/	FY 1991 Request
Natural Gas Regulation - Operating Expenses	$ 54,739	$ 55,636	$ 57,301
Hydropower Regulation - Operating Expenses	26,050	30,626	35,795
Oil Pipeline Regulation - Operating Expenses	2,615	3,390	3,206
Electric Power Regulation - Operating Expenses	24,503	25,266	26,448
Total Operating Expenses	$107,907	$114,918	$122,750
Estimated Offsetting Collections	-107,907	-114,918	-122,750
Estimated Net Expenses	$ -0-	$ -0-	$ -0-

1/ Original FY 1990 appropriation of $116,550,000 was reduced by $1,632,000 under the FY 1990 sequester.

Authorization:

Natural Gas Regulation: Natural Gas Act; Natural Gas Policy Act; Natural Gas Wellhead Decontrol Act; Alaska Natural Gas Transportation Act; Public Utility Regulatory Policies Act; Department of Energy Organization Act; Outer Continental Shelf Lands Act; Energy Security Act; Regulatory Flexibility Act; Crude Oil Windfall Profit Tax Act; National Environmental Policy Act; Endangered Species Act; Fish and Wildlife Coordination Act; Wild and Scenic Rivers Act; Clean Water Act; Coastal Zone Management Act; Federal Pollution Control Act; National Historic Preservation Act; Federal Managers Financial Integrity Act; Paperwork Reduction Act; and Computer Security Act.

Hydropower Regulation:	Federal Power Act; Public Utility Regulatory Policies Act; Department of Energy Organization Act; Energy Security Act; Regulatory Flexibility Act; Crude Oil Windfall Profit Tax Act; Pacific Northwest Electric Power Planning and Conservation Act; National Environmental Policy Act; Fish and Wildlife Coordination Act; Wild and Scenic Rivers Act; Eastern Wilderness Act; Wilderness Act; National Historic Preservation Act; Clean Water Act; Endangered Species Act; Coastal Zone Management Act; Federal Pollution Control Act; Niagara Redevelopment Act; Mining Claims Rights Restoration Act; Land and Water Conservation Fund Act; and Electric Consumers Protection Act.
Oil Pipeline Regulation:	Interstate Commerce Act; Department of Energy Organization Act; Regulatory Flexibility Act; Outer Continental Shelf Lands Act; and Crude Oil Windfall Profit Tax Act.
Electric Power Regulation:	Federal Power Act; Public Utility Regulatory Policies Act; Powerplant and Industrial Fuel Use Act; Department of Energy Organization Act; Energy Security Act; Regulatory Flexibility Act; Crude Oil Windfall Profit Tax Act; Pacific Northwest Electric Power Planning and Conservation Act; Flood Control and River and Harbor Acts; Bonneville Project Act; Eklutna Project Act; Falcon and Amisted Dam Act; Federal Columbia River Transmission Act; Reclamation Project Act; Nuclear Waste Policy Act; National Environmental Policy Act; Endangered Species Act; the Public Utility Holding Company Act; and the Regulatory Fairness Act.

Federal Energy Regulatory Commission
FY 1991 Congressional Budget Request

PROPOSED APPROPRIATION LANGUAGE

For necessary expenses of the Federal Energy Regulatory Commission to carry out the provisions of the Department of Energy Organization Act (Public Law 95-91), including services as authorized by 5 U.S.C. 3109, including the hire of passenger motor vehicles; official reception and representation expenses (not to exceed $3,000); [$116,550,000] $122,750,000 which shall remain available until expended; Provided, That hereafter and notwithstanding any other provision of law, not to exceed [$116,550,000] $122,750,000 of revenues from fees and annual charges, and other services and collections in fiscal year [1990] 1991, shall be retained and used for necessary expenses in this account, and shall remain available until expended: Provided further, That the sum herein appropriated shall be reduced as revenues are received during fiscal year [1990] 1991, so as to result in a final fiscal year [1990] 1991 appropriation estimated at not more than $0.

Federal Energy Regulatory Commission
FY 1991 Congressional Budget Request

EXECUTIVE SUMMARY

The Federal Energy Regulatory Commission's (FERC) FY 1991 budget request is for $122,750,000 and 1,570 full-time equivalent (FTE) staff years.

This request is an increase of $7,832,000 over the FY 1990 adjusted appropriation. The requested increase is needed primarily to: support growth in requirements for statutorily mandated environmental work in the hydropower and pipeline certification activities; implement natural gas regulatory automation requirements; and cover fixed cost increases to basic program support services.

In addition the Commission will process about 26,000 workload items during FY 1991, including more than 15,000 docketed program workload items. This level of effort reflects the continuing high volume of complex, highly technical workload such as preparation of environmental impact statements, gas pipeline certificate and rate matters involving large volumes of natural gas, and major hydroelectric applications that must be acted upon in a timely manner. Tables showing the overall workload of the Commission are shown on pages 13 through 15.

Full Cost Recovery

Under authority of the Omnibus Budget Reconciliation Act of 1986 and other laws, the Commission has a system of annual charges and fees to collect the full cost of operations. The revenue generated from these charges and fees results in a net appropriation of $0.

Transition to Complete Wellhead Decontrol

The Natural Gas Wellhead Decontrol Act of 1989 will deregulate all natural gas prices at the wellhead by January 1, 1993, thus completing the decontrol process the Natural Gas Policy Act (NGPA) began. The new legislation will gradually remove all remaining natural gas producer-related certificate and rate filing requirements. FERC will continue to process well determinations which may continue after January 1, 1993, and the Commission will be required to continue to collect, process and/or publish industry filing data. However, the Commission will review its existing authorities to streamline and simplify as much as possible the transition to complete wellhead decontrol, and to appropriately reduce unnecessary filing, recordkeeping, and reporting requirements.

We have shifted staffing in this budget request from those Producer Regulation workload categories no longer necessary in light of wellhead price decontrol. Further review of existing filing requirements will be conducted to eliminate those that are no longer necessary. As the final date for decontrol approaches, we will shift more personnel and resources from the producer area to high impact workload areas.

Automation and Data Collection

The Commission revised its regulations in FY 1989 for the filing of purchased gas-cost adjustments (PGAs) to allow pipelines to better respond to rapid changes in the gas market. The regulations required electronic filing of PGAs. The Commission accesses and analyzes the PGA filings through personal computers. This requirement for the electronic filing of PGA information began the process of automation at the Commission.

The Commission's next step in the automation process was issuance of Order Nos. 493 and 493-A. These orders -- with OMB approval and authorization of their data collection concept -- provided a time schedule and methodology for the industry to convert from filing hard copies to filing on electronic media. Key dates were October 31, 1989, when all pipelines were required to begin filing rate and certificate applications on electronic media and November 1, 1989, after which time all regulated pipelines were required to file their gas tariff (Volumes 1 and 1A) concurrently with their next NGA Section 7 or Section 4 filing. The benefits of resource savings and expedited processing at the Commission will not be significantly measurable until the electronically filed data is structured into relational data bases and the Commission develops network systems for analysis and processing of workload.

The Commission's FY 1991 budget request proposes a significant commitment to automation in the Natural Gas program area. Specifically, we must increase the technical staff's capabilities by equipping them with personal computers and requisite software, and providing for computer communications between technical offices and other offices who work on gas-related cases.

Management and Policy Overview

The Commission is obligated to render sound decisions expeditiously for the Nation's consumers and the industries subject to its jurisdiction. For this reason, the Commission adopted an automation policy to improve the quality and timeliness of its decisions as well as the accessibility to Commission information and issuances.

To implement this policy, the Commission has installed over 900 personal computers in the past three years with standard software packages. These personal computers have replaced outdated equipment and many labor intensive procedures and are used to prepare rate analyses, audits, workflow tracking, training, application development, and operational activities such as the Commission Issuance Posting System--an electronic bulletin board system. The Commission also has approximately 50 portable computers which, by using a modem, increase the productivity of headquarters and regional office staff to exchange information between their field location and headquarters in a timely manner.

In FY 1989, the Commission embarked on an automated forms management program for producing and completing information on widely used FERC administrative forms, and eliminating the need to purchase and store these forms. To date,

three of the most extensively used forms in the Commission have been automated. The Commission is also exploring automated means for existing Commission and standard forms in areas such as travel, mail, information tracking and other management applications.

Other initiatives which have been taken, all of which are aimed at improving the efficiency of operations, are:

- Awarded contract in September 1989 for local area networking technology hardware, software, and support.
- Plans to purchase additional personal computers, some of which are to replace older, outdated equipment.
- Installation of local area networks in the five Commissioners' offices to expedite the movement and sharing of information within these offices.
- Installation of standard menu software on all Commission personal computers to ease use and provide a standard interface to all application software.
- Development of personal computer applications for case tracking, records tracking, Freedom of Information Act requests, personnel management, publications management, and contract administration.

Natural Gas Initiatives

In the 1980's, the Commission formulated and began to implement major interstate pipeline initiatives which would assist the progress of economically efficient actions by industry segments. Chief among the tools the Commission used to effect this progress is a broad-based gas strategy that has triggered the evolution of programs and policies from Order No. 436. Among other things, the Order provided for nondiscriminatory, open access to transportation.

In June 1987, the U.S. Court of Appeals for the District of Columbia Circuit remanded Order No. 436. The Court upheld the essential authority which the Commission had invoked: to condition transportation certificates on the pipelines offering transportation service to all potential shippers on a nondiscriminatory basis. One of the Court's concerns was in the rule's failure to address adequately the issue of costs which pipelines had incurred from uneconomic gas supply contracts with take-or-pay provisions. In August 1987, the Commission issued an interim rule in Order No. 500 which addressed the take-or-pay problem and contract demand reduction in response to the Court's remand of Order No. 436.

In October 1989, the U.S. Court of Appeals for the District of Columbia Circuit remanded Order No. 500 to the Commission. The Court primarily directed the Commission to provide additional reasoned support for the treatment of take-or-pay matters in Order No. 500. In December 1989, the Commission issued a final rule in Order No. 500. The rule establishes a permanent open-access, nondiscriminatory gas transportation program and addresses the Court's concerns about

resolution of take-or-pay issues. The Order Nos. 436/500 programs address major factors affecting the industry's performance. Therefore, successful implementation of these programs is of great significance to the Commission's regulation of a market-based industry.

The FY 1991 budget request provides for the continued implementation of FERC's broad-based gas strategy. This program addresses such key issues as:

* Open Access Transportation;
* Pipeline Rate Design Initiatives;
* Take-or-Pay;
* Gas Inventory Charges;
* Capacity Brokering;
* Expanding Pipeline Capacity;
* Development of Gas Supply;
* Abandonment of Certificated Services;
* Fair Market Practices; and
* Automated Data Collection.

In addition to ensuring reliable supplies of gas at reasonable prices to consumers, one of the Commission's most important goals is to establish a regulatory framework flexible enough to permit pipelines to offer a variety of unbundled services, including open-access transportation. This budget requests the resources necessary to implement the Commission's objectives.

Open-Access Transportation

The Commission administers several programs for moving gas to markets. Self-implementing transactions provided for under the NGPA and prior notice filings begin without prior Commission approval, subject to specific reporting requirements. These programs support a national transportation network that makes gas available where it is needed most. Offshore transportation lets producers compete in the gas market and is necessary to provide consumers with the widest possible choice of supplies. The Commission issued a final rule in December 1988 to implement open access offshore transportation under the Outer Continental Shelf Lands Act (OCSLA) in Order 509.

By the end of FY 1989, 80 interstate pipeline companies had filed for blanket certificates to transport gas through the provisions for self implementing transactions or prior notice filings of Order Nos. 436/500. The Commission has acted on 69 of the applications, and 52 pipelines have accepted the certificates the Commission issued to them. Of the 23 largest pipelines, 22 have

accepted blanket certificates. FY 1989 saw a significant increase in the number of prior notice filings from companies holding blanket certificates. A recent industry report shows that transportation of gas for others makes up approximately 75 percent of interstate pipelines' throughput. This compares to just 9 percent in 1984, before open-access transportation began.

Pipeline Rate Design Initiatives

The Commission investigates proposed rates and services. The NGA requires that rates and charges be just and reasonable and not unduly discriminatory. These requirements protect consumers from abuses of market power and ensure that the pipelines are compensated for prudent and necessary service costs, including a fair return on investment.

Rate Design. In May 1989, the Commission clarified the rate design objectives of Order Nos. 436/500 by issuing a policy statement on Interstate Natural Gas Pipeline Rate Design.

The Policy Statement discusses several specialized rate issues and makes clear that the Commission's rate design objectives for open access transportation apply equally to sales services. The Policy Statement also reiterates the importance of third-party marketing of capacity rights on pipeline systems (capacity brokering) and efficiently priced, unbundled gas service to provide customer-tailored menus. The Policy Statement directed the participants in 39 specified rate proceedings to explore fully all issues discussed in that Statement. Since issuing the Policy Statement, the Commission has remanded numerous settlement agreements for further exploration of these issues and has also required Policy Statement issues to be explored fully in new rate cases filed after May 1989.

Incentive Ratemaking. The Commission is also looking at incentive ratemaking which would provide pipelines with a stronger incentive to lower the cost of operations and to price services more efficiently. This would be achieved by giving pipelines a stronger motivation to innovate and streamline operations by allowing them to retain a portion of any cost-saving gains they achieve. Consumers will also benefit by receiving a share of those gains. Incentive regulation also should produce administrative savings since comprehensive rate filings would be less frequent.

Take-or-Pay

Producer contracts with requirements for the contracting pipeline to take-or-pay for specific volumes of gas regardless of market conditions have resulted in billions of dollars of liabilities for many pipelines. Prior to Order No. 500, pipelines could recover these costs only by increasing their sales price. However, the higher rates often were unmarketable. In Order No. 500, the Commission created an alternate method of take-or-pay recovery called the equitable sharing mechanism.

The Commission has issued a decision on most of the proposals it received for the equitable sharing program. Through negotiations, pipelines have resolved over $44 billion in take-or-pay liability and contract reformations at an expenditure of $8.6 billion. Of this total amount, the pipelines will absorb 39 percent, direct bill approximately 39 percent, and recover the remaining 22 percent through a volumetric surcharge which each pipeline will base on its total pipeline throughput.

Gas Inventory Charges

In Order No. 500, the Commission outlined principles to govern a gas inventory charge (GIC). The charge is intended to afford a reasonable method of compensating pipelines for the cost of maintaining gas supplies on a current basis and thus avoiding future take-or-pay problems.

In May 1989 the Commission issued a Notice of Proposed Policy Statement on Interim Gas Supply Charges and Interim Gas Inventory Charges. Fourteen pipelines have requested GICs. These included six permanent GIC proposals and four interim proposals filed with the Commission in FY 1989. In April 1989 the Commission established a unique hearing process, called "paper hearings," for the GIC program to quickly process the proposal of El Paso Natural Gas Company (El Paso). The paper hearings are designed to shorten review and decision-making time on GIC proposals substantially. Paper hearings do this by allowing the Commission to conduct the proceedings through direct written correspondence with the applicant, instead of in a formal hearing before an Administrative Law Judge. Since April, the Commission has established paper hearing procedures for four proposals, and set two cases for formal hearing. In November 1989 the Commission issued El Paso a GIC certificate, the first case to complete the expedited "paper hearing" review process.

Capacity Brokering

The Commission is examining capacity brokering as one of several approaches that can effectively allocate the space in pipelines while fully implementing the open access program. In April 1988, the Commission issued a Notice of Proposed Rulemaking entitled "Brokering of Interstate Natural Gas Pipeline Capacity."

Since it established general guidelines for the program, the Commission has received eight requests seeking approval of capacity brokering. It has approved four program proposals. One approved proposal was not accepted by the applicant. There were four proposals awaiting the Commission's consideration at the end of FY 1989.

Expanding Pipeline Capacity

Because of the evolving energy situation throughout the 1980's and the open access transportation program, additional market opportunities for gas have emerged. Reviewing the numerous filings for expanded capacity in the Northeast and on the West Coast was a major Commission priority in FY 1989.

DEPARTMENT OF ENERGY
FY 1991 CONGRESSIONAL BUDGET REQUEST
OFFICE OF INSPECTOR GENERAL
(Obligations dollars in thousands)

OBJECT CLASS SUMMARY

Office of Inspector General

Direct Funding:	FY 1989	FY 1990	FY 1991
11.1 Full-time permanent	$ 8,644	$10,985	$11,923
11.3 Other than full-time	253	234	236
11.5 Other compensation	128	240	257
11.9 Total personnel compensation	9,025	11,459	12,416
12.1 Benefits	1,580	2,280	2,552
21.0 Travel	960	1,300	1,433
25.0 Other services	10,963	10,899	12,020
31.0 Equipment	---	---	---
99.0 Total obligations	$22,528	$25,938	$28,421

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Northeast During FY 1990 and FY 1991, the Commission will continue to process the complex proposals for expanding pipeline capacity in the Northeast. The proposals involve domestic and Canadian supplies that will supplement current supply and serve new and incremental markets. The Commission received over 70 complex applications in response to its announced open season for the filing of new and updated applications for service to the Northeastern United States. In sum, the projects in these applications aggregated to over 6.4 billion cubic feet per day of maximum service, almost $5 billion in new facilities, and more than 3,700 miles of pipeline.

Through consolidation of projects, utilization of settlement procedures, dismissal of redundant applications, and the use of an environmental support contractor, the Commission pared the Northeast workload down to eight traditional NGA Section 7 certificate applications and one optional certificate application. The settlement of most of the competing issues by the major project sponsors and the accompanying project consolidations have avoided lengthy, and costly, comparative evidentiary hearings. It has allowed the projects to remain on schedule for certification by the end of 1990.

At the end of FY 1989, the Commission had approved 18 projects accounting for over 700 miles of pipeline and almost 2 billion cubic feet per day of gas service.

West Coast. Because of poor air-quality, other environmental concerns, and readily available, inexpensive supplies of gas, new cogeneration and additional enhanced oil recovery markets have developed in California. In FY 1989, the Commission received six applications proposing to deliver gas to the California market. This past year the Commission issued optional certificates to WyCal and to Mojave Pipeline Company to serve West Coast markets.

At the end of FY 1989, there were eleven applications pending to bring additional gas supplies, both domestic and Canadian, to the California market. Although several applicants seek authority for the same facilities under both the optional certificate and traditional NGA Section 7(c) procedures, these applications represent a gross investment of $4.8 billion, involve almost 5,300 miles of pipeline, and a delivery capacity of over 7 billion cubic feet per day.

Development of Gas Supply: Mobile Bay Pipeline Projects

In addition to the Northeast Projects and markets on the West Coast, the Commission has been reviewing proposals to develop offshore gas reserves and the establishment of a transportation network to move the gas from the Mobile Bay Region of Alabama to market. With estimated reserves of over 5 trillion cubic feet, the Mobile Bay Region represents the biggest domestic discovery of natural gas since Prudhoe Bay. This is one of the largest certificate projects filed with the Commission in over 20 years for attaching a supply of gas in the United States to markets.

The Commission is currently reviewing 14 applications that were filed in response to its open season for pipelines seeking certificates to transport ga produced from Mobile Bay by the end of 1990. The applications propose almost 1,000 miles of pipeline, 6 billion cubic feet per day of capacity, and will cost $700 million.

The Commission is making every effort to have the proposals ready for its consideration by early 1991. It is analyzing gas supply, environment, and possible competitive issues which the applications raise. As a result of this analysis, the Commission will determine which projects are viable, which are ripe for consideration, and which are competitive and will be subject to competitive hearings. The Commission is relying on the support services of a contractor to conduct the analysis of the projects' environmental impacts, as required by the National Environmental Policy Act.

Marketing Affiliates

The Commission adopted the marketing affiliates rule (RM87-5) in June 1988. The rule guards against pipelines favoring their marketing affiliates in providing transportation services. It established standards of conduct and automated reporting requirements intended to prevent preferential treatment of an affiliated marketer by an interstate pipeline in providing transportation services. On December 13, 1989, the Commission extended the reporting requirements of affiliate transactions through December 1990.

Abandonment

The Commission issued Order Nos. 451 and 451-A to establish, among other things, a "good faith negotiation" procedure. Under this procedure, a first seller whose contract allowed the contract price to rise to a higher ceiling price than that allowed by the buyer may seek to renegotiate the higher price. If no agreement on price is reached, either party could terminate the contract. The Order granted blanket transportation authorization to pipelines which were not open-access transporters to make less difficult the transportation of abandoned or released gas. In July 1989 the Fifth Circuit Court vacated Order Nos. 451 and 451-A. In December 1989, the court denied the Commission's request for a rehearing. The Commission is currently considering its options.

Order No. 490 provides for automatic abandonment where contracts permit, and facilitates other requested abandonments in order to enhance flexibility in the market.

As a result of these abandonment initiatives, the Nation's gas supply can be more efficiently utilized to satisfy consumer needs. The flexibility provided by this market-based approach should assist pipelines and producers as business relationships in the natural gas industry continue to be restructured.

Electric Power Regulation

The FY 1991 budget reflects the Commission's changing workload, increasing complexity of filings, continuing efforts to place greater reliance on market forces, and non-traditional cost-of-service regulation, to set electric rates.

At present, most of the Commission's electric power resources are involved in processing conventional rate filings. In the recent past, rate increase filings declined as utilities deferred rate increases and construction slowed down. Construction or new power purchases are now resuming. We expect, therefore, that utilities will file more rate increase applications for the requirements service customers. Moreover, we expect wholesale customers to file complaints under the recently enacted Regulatory Fairness Act (RFA). The RFA provides customers with an avenue to contest their present rates and to get refunds. Previously, utilities filed for rate increases in periods of rising costs, but customers had little incentive to file complaints in periods of declining costs since rate relief was prospective only and offered no refunds. In addition, there has been an increasing trend in informational filings.

More electric resources are being allocated to the prudence issue. A specific example of this recently occurred in Docket No. EL88-5. This case, involving allegations of imprudent management of an existing nuclear facility, while still in the early stages of litigation, generated massive discovery documentation (3 years of plant records, corporate plans, depositions of 79 plant employees and several onsite visits) to secure relevant material for staff review. While there are indications this case may settle before going to hearing, a similar case could require significant staff resources, particularly if a settlement is not achieved and a hearing is required.

As a result of ongoing changes in the structure of the electric utility industry, corporate application type filings (reorganizations and mergers) are increasing. Recent merger cases which have come before the Commission required significant staff resources to resolve contested issues. These cases tend to involve complex technical issues, large dollar amounts and short periods for Commission action.

Due to the growing interest by the Commission and the industry in coordination pricing, we have seen, and we will see more frequently in the future, complex and innovative proposals which depart from previous ratemaking experience. We also expect utilities to pursue novel transmission pricing in the future. The level of industry inquiries and contacts which involve transmission are on the increase. Several utilities have indicated that novel agreements are contemplated for the future and some have been received. The Commission set up a Transmission Task Force to attempt to resolve issues on a more generic basis.

Many utilities are contemplating, or have made, purchases from independent power producers in lieu of utility construction (e.g., Ocean State). These new types of contractual relationships will significantly impact workload. Utilities are also considering a departure from traditional vertical integration by

separating all or part of the generation and transmission functions from the distribution function. In addition, new entities are being formed to participate solely as brokers or marketers of wholesale energy (e.g. Citizens Energy Corporation; Portland General Exchange, Inc.). It is not known precisely how many independent power producers will be formed as a consequence of any implementation of market-based rates and streamlined corporate regulation, nor is it precisely known how many conventional public utilities may be in a position, on a transaction-specific basis, to qualify for market-based rate regulation. With the advent of streamlined regulation and as industry interest grows in the Commission's alternative programs, it is estimated that the number of public utilities qualified for streamlined treatment will increase substantially over the next 5 years.

Hydropower Regulation

The Hydropower Regulation program implements all of the hydropower applications requirements for processing under the Federal Power Act and the Electric Consumers Protection Act. These include:

- Evaluation of applicant plans for proposed projects.
- Identification of required enhancement and protection of environmental resources.
- Negotiations with state and Federal agencies to resolve environmental differences.

The Commission's budget request also recognizes several changing characteristics of its hydropower workload. These changes include:

- An increase in staff time required to process complex applications.
- More applications requiring environmental impact statements.
- Significant increases in compliance-type workload resulting from the need to administer the provisions of recently issued licenses.
- Outreach requirements to prepare for relicense filings in coming years.
- Changes in the mix of dam safety inspections because of the large number of projects under construction or going into operation.

Compliance work will continue to be a significant part of hydropower workload in the years ahead due to the changing circumstances, both in number and complexity, of terms and conditions contained in Commission licenses and exemptions. At the requested resource level, the Commission will be able to: (1) manage its growing compliance workload; (2) take appropriate compliance measures for various levels and patterns of noncompliance exhibited by licensees and exemptees; (3) streamline procedures for efficiently processing license and exemption amendments; and (4) compile accurate compliance histories.

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In the Dam Safety program, the requested resources will allow the Commission to maintain the effectiveness of its dam safety program. The number of inspections, which is directly related to licensing activity, has grown rapidly in recent years and is projected to continue to increase.

Oil Pipeline Regulation

There are a number of contested major oil rate cases with many policy issues which are now in various stages of litigation. A recent judicial decision has forced the Commission to move toward the traditional cost-based utility-style regulation set forth in the ratemaking methodology which the Commission established for Williams Pipe Line Company in Opinion No. 154-B.

In FY 1989, the Commission continued work on the Buckeye Pipe Line case and considered the Texas Eastern Products Pipeline Company (TEPPCO) case. The Buckeye Pipe Line case is undergoing a phased hearing process and is still in litigation. Phase I was established to study the pipeline's competitiveness. If the oil pipelines prove that their rates are competitively constrained, light-handed rate regulation may be warranted. If they are unable to prove competitiveness, then a Phase II hearing of the more traditional cost-based methodology may be necessary.

Texas Eastern Products Pipeline Company requested light-handed regulation in an interlocutory appeal dated September 6, 1988. The Commission addressed this matter in an order issued in November 1988. The Commission directed TEPPCO to demonstrate that it lacks significant market power before the Commission determines whether TEPPCO must comply with the Opinion No. 154-B methodology to justify its proposed proportional rates.

The Commission expects to act on these two landmark cases in FY 1990. The outcome will significantly affect the Commission's future ratemaking policy for the oil pipeline industry.

The Commission will continue its efforts to handle additional considerations necessary to establish appropriate rates in formal rate cases, and will continue to review oil pricing cases referred by the Department of Energy.

Conclusion

The Commission has broad responsibilities concerning the Nation's natural gas industry, electric utilities, hydroelectric projects and oil pipeline transportation system. Its primary mission is to ensure that consumers receive adequate, reliable supplies of natural gas and electric power at the lowest possible cost while providing opportunities to suppliers and transporters of energy to adjust rapidly to changing market conditions.

As the gas industry witnesses removal of unnecessary and outmoded restraints on natural gas, the Commission supports the concept that the Nation's energy needs are best served by permitting competitive forces to work through the marketplace to maintain the appropriate balance between supply and demand. It is

important for the Commission to modernize and automate its gas regulatory processes, to refine and extend its market-oriented policies. This should allow the markets to operate more fully and efficiently.

In the electric power area, the Commission is charged with ensuring that wholesale rates are just and reasonable and not unduly discriminatory or preferential. In this area too, efforts continue to place greater reliance on market forces--and not traditional cost-of-service regulation--to set electric rates.

In hydropower, the Commission will continue its efforts to implement ECPA, continue to process increasingly more complex applications--many requiring environmental impact statements, strengthen compliance activities, continue outreach requirements to prepare for relicensing of hundreds of existing projects, and maintain an effective dam safety program.

In addition, environmental analysis continues to be increasingly prominent in Commission activities, especially in hydroelectric licensing and building of natural gas pipelines. The Commission would like to emphasize that it will not shortcut the environmental requirements that have been enacted by Congress--and is striking a fair balance between being responsive and being environmentally responsible.

This budget request of $122,750,000 and 1,570 FTE's reflects these policies and the new program realities of the 1990's already discussed. It is the minimum amount necessary to process a projected high volume of applications and other workload in a timely, effective manner.

Finally, offsetting revenues generated from Commission fees and annual charges will result in a net appropriation of $0.

Federal Energy Regulatory Commission
FY 1991 Congressional Budget Request

SUMMARY OF RECEIPTS

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate
DOCKETED WORKLOAD			
Pipeline Certificates	2,303	2,272	2,272
Pipeline Rates	7,111	7,214	7,203
Producer Regulation	2,282	1,040	800
Hydropower Licensing	360	422	431
Project Compliance and Administration	2,408	2,447	2,509
Oil Pipeline	270	366	314
Electric Power	1,457	1,533	1,588
Subtotal	16,191	15,294	15,117
NON-DOCKETED WORKLOAD			
Producer Regulation	17,101	9,910	6,810
Dam Safety Inspections	2,217	2,240	2,360
Subtotal	19,318	12,150	9,170
TOTAL RECEIPTS	35,509	27,444	24,287

Federal Energy Regulatory Commission
FY 1991 Congressional Budget Request

SUMMARY OF COMPLETIONS

	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate
DOCKETED WORKLOAD			
Pipeline Certificates	2,212	2,315	2,315
Pipeline Rates	7,186	7,299	7,242
Producer Regulation	2,471	1,068	800
Hydropower Licensing	502	461	459
Project Compliance and Administration	2,275	2,266	2,368
Oil Pipeline	255	386	327
Electric Power	1,517	1,537	1,595
Subtotal	16,418	15,332	15,106
NON-DOCKETED WORKLOAD			
Producer Regulation	18,573	10,604	8,310
Dam Safety Inspections	2,217	2,320	2,655
Subtotal	20,790	12,924	10,965
TOTAL COMPLETIONS	37,208	28,256	26,071

Federal Energy Regulatory Commission
FY 1991 Congressional Budget Request

SUMMARY OF PENDING WORKLOAD

	FY 1988 Actual	FY 1989 Actual	FY 1990 Estimate	FY 1991 Estimate
DOCKETED WORKLOAD				
Pipeline Certificates	608	699	656	613
Pipeline Rates	921	846	761	722
Producer Regulation	332	143	115	115
Hydropower Licensing	480	338	299	271
Project Compliance and Administration	482	615	796	937
Oil Pipeline	109	124	104	91
Electric Power	406	346	342	335
Subtotal	3,338	3,111	3,073	3,084
NON-DOCKETED WORKLOAD				
Producer Regulation	5,366	3,894	3,200	1,700
Dam Safety Inspections	597	597	517	222
Subtotal	5,963	4,491	3,717	1,922
TOTAL PENDING	9,301	7,602	6,790	5,006

Federal Energy Regulatory Commission
FY 1991 Congressional Budget Request

NATURAL GAS REGULATION

Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request
Natural Gas Regulation			
Pipeline Certificates - Operating Expenses	$19,739	$22,042	$24,050
Pipeline Rates - Operating Expenses	27,553	28,300	29,743
Producer Regulation - Operating Expenses	7,447	5,294	3,508
Natural Gas Regulation - Total Operating Expenses	$54,739	$55,636	$57,301
FTE's	750	744	729

Authorization:

Natural Gas Regulation: Natural Gas Act; Natural Gas Policy Act; Natural Gas Wellhead Decontrol Act; Alaska Natural Gas Transportation Act; Public Utility Regulatory Policies Act; Department of Energy Organization Act; Outer Continental Shelf Lands Act; Energy Security Act; Regulatory Flexibility Act; Crude Oil Windfall Profit Tax Act; National Environmental Policy Act; Endangered Species Act; Fish and Wildlife Coordination Act; Wild and Scenic Rivers Act; Clean Water Act; Coastal Zone Management Act; Federal Pollution Control Act; National Historic Preservation Act; Federal Managers Financial Integrity Act; Paperwork Reduction Act; and Computer Security Act.

Goals of the Natural Gas Regulation Program:

- Ensure that all rates and conditions of service for the sale and transportation of natural gas in interstate commerce are in compliance with the Commission's statutory mandates.

- Formulate, develop, and implement regulatory programs and policies which will help the industry and the public adjust to the significant economic and regulatory changes occurring in the gas industry. These changes include: (1) the phased removal of wellhead price controls pursuant to the Natural Gas Policy Act (NGPA) of 1978; (2) the Natural Gas Wellhead Decontrol Act to be fully effective in 1993; (3) the changing role of pipeline activity from sales to transportation; (4) the restructuring of business relationships among all segments of the industry; and (5) reliance on competitive market forces to establish just and reasonable rates where appropriate.

- Apply innovative and cost-effective policies, procedures, automation, and contractual efforts to replace or eliminate labor-intensive operations and activities where it is feasible and appropriate.

- Adhere to the specific programmatic and policy goals of the Commission for gas regulation as they arise from statutory requirements. Conduct comprehensive management controls to assess and adjust program implementation as needed.

- Apply computer technology to assist staff and the public in data collection, as well as analysis and timely dissemination of information.

- Institute, administer, and review data collection procedures to ensure that they provide the Commission with the regulatory information it needs to evaluate industry developments and monitor economic market forces.

- Evaluate the impact of the Natural Gas Policy Act of 1978, the Natural Gas Act (NGA), and Natural Gas Wellhead Decontrol Act of 1989 on current gas markets, projected gas markets, and market ordering.

Specific Objectives for FY 1991:

- Process remaining open-access applications in a timely manner with existing staff.

- Implement Order Nos. 436/500, as amended.

- Continue work on Northeast Projects.

- Process expeditiously and effectively applications for participation in the Commission's optional certificate program.

- Resolve issues related to the brokering of excess capacity.

- Process expeditiously and effectively applications to serve new markets, especially in the Pacific Northwest and California.

- Expeditiously and effectively meet the Commission's statutory requirements for environmental reviews, certification procedures, and compliance with regulations.

- Consider proposals for implementing pipeline incentive rates that account for efficiency gain.

- Expeditiously and effectively process applications for gas inventory charges.

- Adjust Commission policy to address any Court mandates and concerns in gas industry cases.

- Fully and effectively adjust the programmatic and staffing structures to address the changes resulting from wellhead decontrol.

- Expeditiously address the rate-design initiatives discussed in the Commission's Policy Statement Providing Guidance with Respect to the Designing of Rates, issued in May 1989.

- Continue to eliminate unnecessary levels of review by delegating additional decisionmaking to the most appropriate level.

The regulatory changes the Commission expects to implement fully during FY 1991 will allow more flexibility in the natural gas industry. There is a continuous emphasis throughout this budget on the evolution of a regulatory policy and modernization theme that accommodates the forces of change taking place in the energy industry. This type of policy will allow greater flexibility for parties to engage in transactions on a self-implementing basis instead of transactions which require traditional, and often protracted, judicial-type, case-by-case, administrative resolution of regulatory issues. Two significant aspects of the Natural Gas Regulation program are (1) following the goals of the Commission's Gas Strategy, and (2) identifying, implementing, assessing, and providing the means to reach the goals. A third aspect is ensuring that the management and staff infrastructure and automated tools, which are essential to the first two aspects, are securely in place.

The Commission will continue to modernize administrative operations. Efforts during FY 1991 will be directed to applying computer technology to staff review and analyses. The availability of automated procedures will expedite evaluation of issues.

Natural Gas Regulation Program--FY 1991

The Commission is responsible for pipeline and producer certificate and rate regulation to ensure that the sale and transportation of natural gas is in the public interest and that service is provided at the lowest reasonable rates, consistent with the requirements of safe and reliable long-term service.

The NGA mandates the Commission to regulate the transportation of gas in interstate commerce and the sale for resale of natural gas in interstate commerce by issuing certificates of public convenience and necessity for these services as well as for the construction and operation of facilities. The Commission also administers the rates for these services.

The NGPA expanded the Commission's rate jurisdiction by requiring it to administer ceiling prices for certain categories of natural gas production in interstate and intrastate commerce. It also required the Commission to implement procedures that permit intrastate pipelines to sell, transport, and assign natural gas on behalf of any interstate pipeline or local distribution company. Finally, the NGPA significantly altered pipeline curtailment priorities. The Act provided that interstate gas deliveries needed for certain essential agricultural and industrial uses generally would not be curtailed unless gas was needed to serve higher priority users.

The Department of Energy Organization Act vested all regulatory aspects of the import and export of natural gas in the Secretary of Energy. A portion of this responsibility--namely, the approval of the construction and operation of facilities and approval of the point of entry where new facilities are required--has been delegated to the Commission. The Secretary charged the Commission with processing related applications to construct and operate associated jurisdictional facilities and regulating the delivery and sale of imported natural gas in interstate commerce.

As the NGPA stipulated, certain categories of gas were decontrolled January 1, 1985. The Commission implemented the changes this decontrol required by issuing Order No. 406 on November 16, 1984. In general, Order No. 406: (1) reaffirmed the need to file jurisdictional agency determinations for certain gas which was to be deregulated; (2) provided for interim collections by the producer at deregulated prices; and (3) clarified the fact that gas qualifying for a deregulated price category as well as a regulated price category would be deregulated. The final phase of NGPA deregulation occurred in July 1987. In May 1988, the Supreme Court upheld the deregulation provisions of Order No. 406. Approximately 60 percent of all natural gas is currently decontrolled.

Natural Gas Wellhead Decontrol

The passage of the Natural Gas Wellhead Decontrol Act in 1989 (Decontrol Act) results in the deregulation of all gas prices at the wellhead by January 1, 1993, completing the process the NGPA began through its provisions for phased decontrol. In addition to decontrolling gas prices, the legislation gradually removes all remaining Natural Gas Act certificate and rate filing requirements pertaining to producers which expire on or before January 1, 1993. The Commission has proposed, in a Notice of Proposed Rulemaking issued on December 13, 1989, to amend its regulations to reflect the provisions of the Decontrol Act. After comments are reviewed, a final rule will be issued. In recognizing this gradual decontrol transition, the Committee on Energy and Natural Resources in its conference report indicated that it expected the Commission to use its

existing authorities "to streamline and simplify as much as possible the transition to complete wellhead decontrol, and to appropriately reduce unnecessary filing, recordkeeping, and reporting requirements." However, the Committee also indicated that it expects the FERC and other agencies to continue to collect and publish all appropriate data, including wellhead pricing data and other natural gas-related statistics, which are necessary for a full understanding of the industry.

To ease the transition to decontrol, the Commission's budget submittal reflects scaled down workload and staffing in Producer Regulation which is mainly impacted by the wellhead price decontrol legislation. Further workload reductions and staffing shifts will occur until the final date for decontrol.

The Commission's Natural Gas program illustrates the complex issues a regulatory agency faces when it attempts to allow and encourage market-based behavior in a partially regulated environment. By enacting the NGPA, Congress pointed the natural gas industry in the direction of competitive markets and market pricing. The Commission's objective has evolved into one of dovetailing competitive elements in the industry with those which continue to require varying degrees of regulation under its statutory mandates. It has been necessary for the Commission to refashion rigid regulations which hinder the industry's ability to react to market conditions while preventing concentrated market power from distorting the transmission of price signals. The Commission's gas program for FY 1991 emphasizes an evolving regulatory policy that seeks to rely more extensively on market forces to generate just and reasonable results where feasible. This gives gas industry participants greater flexibility to engage in transactions on a self-implementing basis.

Orders No. 436 and 500

With both general and specific regulatory goals in mind, the Commission began to formulate and implement major natural gas regulatory reforms which would facilitate economically efficient actions by industry segments. Lessening regulation where it is appropriate would allow timely responses to the new competitive pressures and the economic requirements of market place restructuring. Chief among the tools the Commission used to effect this are the programs and policies of Order Nos. 436/500.

In June 1987, in Associated Gas Distributors v. FERC, the U.S. Court of Appeals for the District of Columbia Circuit remanded to the Commission Order No. 436. Among other things, the Order provided for nondiscriminatory, open access to transportation. The Court upheld the essential authority which the Commission had invoked: to condition transportation certificates on the pipelines offering transportation service to all potential shippers on a nondiscriminatory basis. One of the Court's concerns was in the rule's failure to address adequately the issue of costs which pipelines had incurred from contracts with take-or-pay provisions.

The court in AGD was concerned that open-access transportation might adversely affect pipelines' take-or-pay problems in two ways. First, producers might be unwilling to compromise on pipelines' take-or-pay obligations because the

pipelines cannot validly deny the producers transportation if the producers were to refuse to compromise. Second, existing customers could reduce their purchases from the pipelines by converting from sales to transportation service and purchasing from other suppliers. With declining sales to existing customers, a pipeline might be unable to sell the volumes that it must take or pay for under contracts with producers. As a result, the transportation program of Order Nos. 436/500 has become a significant factor that must be considered when solving take-or-pay issues.

In response to the remand, on August 7, 1987, the Commission issued Order No. 500, an interim rule and policy statement on its open-access transportation program. The interim rule aimed to lessen the gas industry's uncertainty over FERC's transportation regulations and to keep gas flowing to consumers while the Commission developed and implemented permanent transportation rules. Orders No. 500-A through G modified Order No. 500 to reduce some of the administrative burden commenters had identified.

On October 16, 1989, in American Gas Association v. FERC, the U.S. Court of Appeals for the District of Columbia Circuit remanded the interim rules of Order No. 500 to the Commission. The Court primarily directed the Commission to provide additional reasoned support for the treatment of take-or-pay matters in Order No. 500.

Final Rule

In December 1989, the Commission issued a final rule in Order No. 500. The rule revises and makes permanent open-access standards, and addresses the Court's concerns about resolution of take-or-pay issues.

Specifically, the final rule: (1) extends the sunset date for filings to recover take-or-pay buy-out/buy-down costs under the equitable sharing approach to December 31, 1990 (or the date a pipeline accepts a gas inventory charge, if earlier); (2) continues the take-or-pay crediting mechanism subject to two modifications--establishment of a termination date of December 31, 1990 (or the date a pipeline accepts a GIC certificate, if earlier) and elimination prospectively of the crediting exemption for casinghead gas provided the pipeline agrees to release any casinghead gas not taken due to application of credits against minimum take obligations (the same release requirement will also extend to other "must-take gas" to which take-or-pay credits are applied); (3) rejects action under the NGA Section 5 to modify producer/pipeline contracts on the ground that such action would be limited to take-or-pay provisions for gas covered by jurisdictional contracts and hence would be ineffective, inequitable or both; (4) opts not to restore the contract-demand reduction option for a pipeline's firm sales customers (originally adopted by Order No. 436 as a condition of open access transportation) on a generic basis; and (5) provides automatic pregranted authority for abandonment of firm sales converted to transportation, and reaffirms automatic abandonment for firm transportation (including converted transportation) upon expiration of the underlying contract.

Besides promulgating the Order No. 500 regulations, the Commission has initiated a number of other innovative regulatory programs stemming from Order No. 436. These will require further analysis and implementation during upcoming years. The Order No. 436/500 programs address major factors affecting the industry's performance. Therefore, successful implementation of these programs is of great significance to the Commission's regulation of a market-based industry.

In January 1987, the Commission's Chairman announced a strategy to trigger further evolutionary changes which are necessary to accommodate the forces of change taking place in the gas industry. The following is a description of the main components of the Commission's evolutionary gas strategy and the means the Commission is following to achieve the strategic goals.

Evolutionary Strategy to Accommodate Changes in the Gas Industry

Take-or-Pay. Order No. 500 incorporated, among other things, a take-or-pay policy statement (Section 2.104 of the Commission's General Policy and Interpretations). The policy statement adds a number of revisions and modifications to the original policy statement issued in April 1985. Principal among these was an equitable sharing mechanism whereby pipelines could recover from their customers certain costs associated with take-or-pay buy-out, buy-down, and contract-reformation payments. Under the revised policy statement, pipelines can seek to recover 100 percent of their take-or-pay buy-out and buy-down costs through their commodity sales rates. Alternatively, pipelines which agreed to accept a blanket certificate for open-access transportation could, at their discretion, agree to absorb from 25 to 50 percent of their take-or-pay costs. These pipelines were entitled to recover, through a fixed charge, an equal percentage of their take-or-pay costs. Remaining costs, up to 50 percent of total take-or-pay costs, could be recovered at the pipeline's option through a commodity rate surcharge or a volumetric surcharge on total pipeline throughput.

Order No. 500-H sets a cut-off date of December 31, 1990, for take-or-pay filings under Order No. 500, with the exception of costs related to contracts in litigation or arbitration as of March 31, 1989. The Commission has issued a decision on most of the proposals it received for the equitable-sharing program. Through negotiations, pipelines have resolved over $44 billion in take-or-pay liability and contract reformations at an expenditure of $8.€ billion. Of this total amount, the pipelines will absorb 39 percent, direct bill approximately 39 percent, and recover the remaining 22 percent through a volumetric surcharge which each pipeline will base on its total pipeline throughput.

While all, or most, of the pipelines that will recover take-or-pay costs under Order No. 500 have filed to establish recovery mechanisms, those pipelines will continue to make filings to recover the costs of any additional take-or-pay settlements they may negotiate with producers. Further staff time will be needed to conduct technical conference proceedings and, in some cases, formal proceedings on the filings. There will also be additional filings as pipelines

file to recover take-or-pay costs under the Order No. 500-F litigation exemption. Many such filings will generate multiple filings as downstream pipelines file to track their billing by upstream pipelines.

Order No. 500 outlined principles to govern a natural gas inventory charge (GIC) to prevent a recurrence of the substantial take-or-pay obligations previously experienced by interstate pipelines. A GIC will permit customers who wish to purchase firm sales service to do so by paying on an on-going basis for the cost of pipelines maintaining a firm gas supply. A gas inventory charge would compensate the pipeline on a current basis for potential future take-or-pay liabilities which they might incur by maintaining gas supply to serve their customers. The gas inventory charge will insure that a pipeline's customers have adequate gas supplies available and, at the same time, protect the pipeline from unfunded take-or-pay claims.

In FY 1989, fourteen pipelines requested authorization for gas inventory charges. These included six permanent gas inventory charge proposals and four interim proposals.

To expedite the processing of permanent GIC applications, the Commission has instituted "paper hearing" procedures. The paper hearings are designed to shorten the review and decisionmaking time substantially by conducting the proceedings through direct written correspondence with the applicant, instead of in a formal hearing before an Administrative Law Judge. Indeed, it is expected that GICs in paper hearings can be processed in months, whereas it could take years if formal hearings are held. For example, on April 27, 1989, the first paper hearing was established for the contested GIC application of El Paso Natural Gas Company. On November 29, 1989, the Commission issued El Paso a GIC certificate.

Since instituting the paper hearing procedure for the El Paso GIC application, the Commission has established similar procedures for the GIC applications of four pipelines (Transco, Tennessee, Natural, and Southern). The Commission instituted formal hearing procedures on two other GIC applications (National Fuel and Northern Natural), because the proposals were significantly related to rate cases that had already been set for formal hearings.

On May 30, 1989, the Commission issued a Notice of Proposed Policy Statement on Interim Gas Supply Charges and Interim Gas Inventory Charges (NOPPS). The NOPPS explores the possibility of implementing interim GICs while a pipeline's application for a permanent GIC is being analyzed and processed. The Commission received approximately 100 comments in response to the NOPPS. All segments of the industry responded. Not surprisingly, the comments ranged from being supportive to being adamantly opposed to the idea of a generic interim GIC.

Four pipelines (Natural, Northern Natural, Texas Gas, and Kentucky West), have sought to implement GICs on an interim basis. Although none of these applications conform strictly to the mechanisms proposed in the NOPPS, they have been modified purportedly to address the individual needs of the

applicants. Each proposal has been protested by both the pipelines' sales customers and independent shippers and marketers. The issues raised by these protests may not be easily or quickly resolved. Each application will have to be analyzed on a case-by-case basis.

The Commission expects that most major interstate pipelines will have filed to receive gas inventory charges by the end of FY 1990.

Fair Market Practices. The open-access provisions of Order Nos. 436/500 have brought to light a situation where certain practices of the natural gas industry may lead to discrimination in the area of first-come, first-served transportation by interstate pipelines. Interstate pipelines have in the past few years established affiliates to purchase natural gas at the wellhead for resale to either end users or distributors. An interstate pipeline would supply transportation service for these purchases. The Commission has become concerned that affiliates may, through corporate ties with the pipelines, have a distinct advantage over other companies for the available transportation capacity. This advantage would allow the affiliates to thwart the increased competition objectives of Order Nos. 436/500.

One of the Commission's primary responsibilities is to prevent pipelines from unduly discriminating against nonaffiliated shippers. In June 1988, the Commission issued Order No. 497. This final rule established standards of conduct for relationships between interstate pipelines and their marketing affiliates, established reporting and recordkeeping procedures, and created procedures for processing complaints. On December 13, 1989, the Commission extended through December 1990 the reporting requirements for affiliate transactions.

Abandonment. In another major regulatory change to implement an evolutionary gas strategy, the Commission issued Order No. 490 on February 5, 1988, to amend its regulations addressing abandonment of service obligations upon contract termination or renegotiation. Order No. 490 allows a gas producer to abandon sales to its interstate pipeline or local distribution company when a wellhead contract has expired or terminated. The producer must give 30 days written notice or any longer period which the contract might require. The abandonment is automatically effective in accordance with the notice given and the abandoning party must notify the Commission of the abandonment within 30 days. If the parties agree to terminate the wellhead contract or to modify their wellhead sales and purchase obligations under the contract, the abandonment is effective in accordance with the parties' agreement. However, one of the parties must notify the Commission within 30 days of the effective date of action.

Once a pipeline becomes an open-access transporter, it can also abandon purchases from producers when the underlying contract expires or is terminated. Pipeline purchasers operating under blanket transportation certificates may also discontinue purchases from other pipelines once their contract expires or otherwise terminates.

The Commission issued Order Nos. 451 and 451-A to establish, among other things, a "good faith negotiation" procedure. Under this procedure, a first seller whose contract allows the contract price to rise to a higher ceiling price may seek to renegotiate the higher price. If no agreement on price is reached, either party can terminate the contract. The Order granted blanket transportation authorization to pipelines which were not open-access transporters to make less difficult the transportation of abandoned or released gas. In July 1989, the Fifth Circuit Court vacated Order Nos. 451 and 451-A. In December 1989, the Commission's request for rehearing was denied. The Commission is currently reviewing its options.

Rate Design. The Commission wants to ensure that rates are designed to foster, not thwart, the benefits of marketplace competition and, consequently, studied various mechanisms to achieve these results. Traditional cost-based rates, ratemaking principles, incentive mechanisms, and market-established rates where markets are truly competitive have all been considered.

In its Policy Statement Providing Guidance with Respect to the Designing of Rates issued in May 1989, the Commission made clear its intent to implement the rate-design objectives set forth in Part 284 of the Regulations with respect to all rates charged by interstate pipeline companies. The Policy Statement makes clear that the Commission's rate design objectives for open access transportation apply equally to sales services.

The Policy Statement identified 39 specific proceedings pending before the Administrative Law Judges to which the Statement would apply. In addition, the Commission has directed that all rate increase filings which companies have made since May address the issues in the Statement. The Commission stated that it intended to apply its principles to cases pending before it on a case-by-case basis.

The Policy Statement is expected to generate innovative rate design proposals which will require close scrutiny by Commission staff to ensure that they achieve the desired results and are consistent with Commission policy directives. The Commission staff will address these issues on a case-by-case basis.

The Commission also is studying rate design approaches which give pipelines stronger incentives for efficient operation. A key feature of the incentive-based approach is an automatic rate adjustment mechanism which allows pipelines and consumers to share any cost-saving gains without a comprehensive rate proceeding. The program also calls for greater pricing flexibility which should enable pipelines to compete more effectively when market conditions change. Finally, incentive regulation also calls for a long-run sharing of pipeline efficiency gains which should enhance cost-saving behavior. The staff may need to address and implement incentive regulation programs.

Effective rate design principles will allow the marketplace to determine the movement of gas supplies. The Commission's rate design and regulatory initiatives for the gas industry will permit the Nation's gas supply to satisfy

consumer needs more efficiently. Moreover, the Nation's broader energy security interests will be served by removing regulatory impediments to the marketing of natural gas, thereby reducing the vulnerability of the economy to oil supply disruptions. Two administrative elements of the gas program--rulemakings and management initiatives--ensure that the regulatory framework and staff capabilities can support the evolving regulation of the natural gas industry.

Rulemakings. The Commission issued in April 1988 a Notice of Proposed Rulemaking in Docket No. RM88-13-000 to allow the holders of firm transportation rights on interstate pipelines to sell or assign (broker) those rights to others. Certificate authorization would be required for pipelines which allow brokering on their systems, and separate certificates would be required for the brokers of that capacity. Early in FY 1989, United Gas Pipe Line Company filed a brokering proposal to be carried out on an experimental basis for 3 years. The Commission approved the proposal by an Order it issued in January 1989. The Commission also approved a Texas Eastern proposal on August 22, 1989.

In April 1988 (Dockets No. RM88-14-000 and RM88-15-000), the Commission issued an interpretive rule and an NOPR which would require any interstate pipeline operating on the outer continental shelf (OCS) to obtain a blanket certificate and offer open-access transportation service on a nondiscriminatory basis. In December 1988, the Commission issued a final rule which granted all OCS pipelines blanket transportation certificates. In April 1989, these blanket certificates became effective. The Commission instituted rate proceedings where necessary to ensure consistency of rates, operating terms, and conditions of OCS pipelines with Part 284 of the Commission's Regulations.

Management Initiatives. The Commission has undertaken major management initiatives since the changes began in the gas industry several years ago. It will continue to pursue strategies that ensure a responsiveness to the complex issues which the agency faces in regulating the gas industry. Restructuring FERC's Office of Pipeline and Producer Regulation occurred as a result of these adaptive strategies. In addition to reorganizing technical staff components to deal with specific problem areas, functions have been consolidated or realigned to expedite and improve analysis of industry filings. An extensive training program was also implemented during FY 1989 to (1) enhance the automation and analytical skills of staff, (2) broaden the understanding and awareness of staff to overall gas program operations, and (3) improve management. Extensive staff training and development will continue in FY 1991.

During FY 1989, the Commission installed additional personal computers and upgraded its existing equipment; automation goals require that additional resources must be in place by FY 1991 to effectively process the electronic filings which the industry started filing in November 1989. The Commission also continues to institute proposals for the submittal of a majority of industry filings on electronic media and to implement the Commission's requirement that rate filings for purchased gas adjustments be submitted on electronic media. This, along with increased computer capability, will provide for a more efficient and accurate method for processing applications before the Commission

and has been part of a Commissionwide effort to modernize operations. Modernization will allow the application of computer technology to areas of data collection and information dissemination through local area networking systems (LANS).

The Commission has acquired computer software and additional personal computer hardware to upgrade the analytical capacity of staff investigating pipeline engineering, marketing, and rate issues. These steps will: (1) facilitate the evaluation of pipeline construction proposals; (2) focus operating issues; (3) further develop mapping capability; (4) assist development of cost-of-service and rate design proposals in rate proceedings; (5) provide access to reserve and production statistics for gas supply and deliverability determinations; and (6) provide access to detailed financial and operating statistics necessary for development of rate of return recommendations. Analytical capability will be enhanced in FY 1990 with the addition of several LANS throughout the Commission. These LANS will link personal computer hardware and software used to develop the studies, and will allow access by authorized staff to data bases and cases being developed for Commission agenda meetings. Additional computer hardware and software will be added in FY 1991 to improve analytical capability. This capability will speed case processing and allow staff to evaluate increasingly complex operating issues which arise as the pipeline industry moves to open-access transportation, market-based rates and unbundled services.

In pipeline rates, computer technology is necessary to implement the Natural Gas Data Collection System which the Commission initiated in Order No. 493, and the filing requirements it established for PGAs in Order No. 483. The Data Collection System aims to develop a new, automated process for data collection. It seeks to (1) expedite the ratemaking process; (2) reduce the burden of research and development for setting rates; and (3) provide more up-to-date information which is specifically targeted to assist the Commission in its gas pipeline ratemaking function. Under Docket No. RM88-12-000 (FERC Form 591), pipelines will submit operational data for their system on electronic media. Electronic data collection will allow the Commission to monitor transportation activities, where appropriate. It will facilitate rate setting and expedite the issuance of certificates by allowing an economic analysis of market environments.

In the area of rate development, computer technology will be instrumental to the development of timely and accurate rate recommendations in gas inventory charge and rate case proceedings. In every area of the rate determination process, e.g., cost of service, depreciation, rate of return, and rate design, computer technology and automated information services will be relied upon to provide pertinent data and improve analyses. Particularly critical for efficient rate development is the availability of an effective cost-of-service module, and the development of programs and procedures which permit data which has been filed electronically on the mainframe to be down loaded into a personal computer environment. Further, computer technology will be used to efficiently and accurately process compliance-type filings.

The Commission will monitor certain pipeline practices which involve marketing affiliates more fully. The transportation data reporting will provide the Commission with the information it needs to monitor regulated pipelines' activities with affiliates, and to use that data as the basis of further action should allegations of abuse arise. Automated systems will also permit the Commission to provide better information to the public more quickly and in forms compatible with modern information-processing technology.

Recent reorganizations have improved procedures and provided staff to assist in the automation and data collection efforts that rulemakings have required. The PGA automated data filing will provide improved and faster determination of actual gas costs and will permit an automatic and immediate comparison of prices for purchases from affiliates versus purchases from nonaffiliates.

Order No. 493 requires that pipeline certificate applications be filed on electronic media. To the extent possible, the Commission intends to develop standard data formats for the various types of certificate applications. This could expedite the application processing by using electronically filed data to more easily make comparisons between a number of related projects.

FY 1991 Resource Requirements

The Commission is requesting a total of $57,301,000 and 729 FTEs for the Natural Gas program in FY 1991, an increase of $1,665,000 over FY 1990 and a decrease of 15 FTEs. The increase in funds is due to the need for automated hardware and related software, local area networks and staff training, additional contract funds for environmental activities related to certificate projects, and this program's share of fixed cost increases.

Funds are required to process the workload which is impacted by the substantive cases and issues in each of the three subprograms: Pipeline Certificates, Pipeline Rates, and Producer Regulation. Tables 1 and 2 summarize the projected workload for these three programs.

Table 1 - Total Natural Gas Workload

	Receipts			Completions		
	FY 1989	FY 1990	FY 1991	FY 1989	FY 1990	FY 1991
Pipeline Certificates	2,303	2,272	2,272	2,212	2,315	2,315
Pipeline Rates	7,111	7,214	7,203	7,186	7,299	7,242
Producer Regulation	19,383	10,950	7,610	21,044	11,672	9,110
Total	28,797	20,436	17,085	30,442	21,286	18,667

Table 2 - Workload Pending at End of Fiscal Year

	FY 1988	FY 1989	FY 1990	FY 1991
Pipeline Certificates	608	699	656	613
Pipeline Rates	921	846	761	722
Producer Regulation	5,698	4,037	3,315	1,815
Total	7,227	5,582	4,732	3,150

Pending workload at the end of FY 1991 is estimated to be 3,150 items, a decrease of about 56 percent from the end of FY 1988. Nearly all of this decrease is attributable to eliminating a backlog of refund actions and overall declines in workload in the Producer Regulation program. The Natural Gas Wellhead Decontrol Act, to be fully implemented after January 1, 1993, will result in further shifts from the producer area as the final effective date approaches. However, these workload declines will be offset by the need to devote resources toward processing the workload related to major certificate projects, the implementation of data collection procedures throughout the pipeline industry, and the Commission's other initiatives designed to allow more competitive market forces to regulate the natural gas industry.

The next 3 years will see tremendous changes in natural gas regulation as the Commission goes from the predominately case-by-case, reactive approach to a more generic, proactive approach in response to the increase of competition in the industry. The Commission's emphasis will be on recognizing those areas where the new policies can be applied so that competition can flourish, and on regulating efficiently those areas where the customer requires the protection provided by the Natural Gas Act and the Natural Gas Policy Act.

Pipeline Certificate Regulation

	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request
Operating Expenses	$19,739	$22,042	$24,050

Goals of the Pipeline Certificate Program:

- Ensure that adequate gas transmission capacity is provided at reasonable rates to guarantee reliable service.
- Provide a regulatory environment that will encourage increased natural gas sales, pipeline expansions, and competition in an expedited fashion.
- Monitor and review programs governing the transportation of natural gas in both interstate and intrastate markets in anticipation of increasing demand for natural gas transportation services.
- Fulfill the objectives of the NGPA by providing for the protection of high priority uses of natural gas.

Specific Objectives for FY 1991:

- Implement the Commission's gas strategy policy to allow the demand for gas and gas delivery services to establish the price for gas and those services.
- Remove or reduce regulatory impediments in competitive markets.
- Expeditiously carry out regulatory responsibilities where markets are not competitive.
- Implement a comprehensive post-certification environmental review program to ensure adherence by certificate holders to environmental impact mitigation conditions contained in certificates.
- Process cases on a current basis to avoid backlogs and to reduce pending workload.
- Implement policy and regulatory adjustments in response to court decisions on the Commission's transportation and pricing programs.
- Process proposals to update supplier-transporter-customer relationships such as abandonments, new sales, storage proposals, capacity brokering and gas inventory charges in response to changing market conditions.
- Enhance environmental, engineering, supply, rate, and market analysis capability through the automation of the certificate filing process and staff review procedures.

Natural gas pipelines transport natural gas from production areas to markets throughout the country. The pipeline industry comprises a pipeline network more than 1 million miles long. It moves over 24 percent of the Nation's annual energy consumption to its point of utilization. A major component of this system is the 270,000 miles of larger-diameter transmission facilities which move gas in interstate commerce over long distances to markets in 47 states. These transmission facilities represent an original investment exceeding $30 billion.

In its pipeline certificate program, the Commission evaluates four types of applications. The first involves applications for authority for gas transportation, sale, storage, or exchange services. The second type covers construction and operation of facilities for use in the transportation, sale, storage, or exchange of natural gas. The third type extends or abandons service. And finally, there are applications to site and construct facilities for the import or export of natural gas. Evaluation of applications, depending on the proposal, could focus on as many as five general areas: (1) identifying and assessing the sources and adequacy of supply and market for the gas; (2) safety and operational aspects of facilities; (3) project financing; (4) the magnitude of environmental impacts associated with certification of the proposed gas projects, as required by the National Environmental Policy Act (NEPA); and (5) determining the operational reliability of liquefied natural gas (LNG) facilities.

The Commission also reviews pipeline curtailment plans mandated in the Natural Gas Policy Act (NGPA) to ensure service to priority end-users in case of gas shortages.

Certificate Applications

Interstate natural gas pipeline companies apply for certificates for the transportation and sale of natural gas for resale in interstate commerce and for the construction and operation of pipeline facilities as required by the Natural Gas Act (NGA).

During the deliberations that led to passage of the NGA, it was generally recognized that interstate gas pipelines were not primarily transporters of natural gas for others. More typically, they were considered to be merchants because they purchased gas in the field, transported it to market, and sold it wholesale to distribution companies. The Congress neither identified them as common carriers nor imposed on them common carriage obligations. The NGA vested the Commission with the responsibility of assuring that rates and charges were just and reasonable. It also required the Commission to determine whether or not it would be in the public interest to certificate a pipeline which proposed to serve a market already being served by another pipeline. Essentially, it was the Commission's responsibility to determine whether--and, if so, to what extent--competition arising from such a proposal would be in the public interest.

In February 1942, Congress amended the NGA to require certificate authorization for the construction and/or operation of interstate pipeline facilities regardless of whether these facilities were involved in competition for the same markets. Congress had concluded that effective rate regulation required a review of construction projects prior to the construction taking place.

The Commission has implemented programs designed to reduce regulatory barriers and to encourage further competition. For example, the original blanket certificate program in Order No. 234, approved in May 1982, was developed for less controversial proposals. It streamlined the regulatory process through its self-implementing feature and by its prior notice procedure. Order No. 436, issued in October 1985, applied the same procedures to transportation transactions.

The blanket certificate open-access transportation program has been so successful that filings in the prior notice category are projected to remain at historically high levels over the next 2 years.

In June 1987, in Associated Gas Distributors v. FERC (AGD), the U.S. Court of Appeals for the District of Columbia Circuit remanded to the Commission Order No. 436. The Court upheld the essential authority that the Commission had invoked: to condition transportation certificates on the pipelines offering transportation service to all potential shippers on a nondiscriminatory basis.

Order No. 436 also established optional certification procedures under Section 7 of the NGA. Pipelines who are proposing new facilities and are willing to assume the economic risk of the ventures can apply for an optional certificate. The intent of optional certificates was to allow pipelines and other eligible applicants to obtain Section 7 certification more quickly and easily without regard to other competing applications as long as environmental standards were met.

The Commission issued its first optional certificate to the Moraine Pipeline Company in February 1988. It issued Wycal an optional certificate in November 1988, to authorize construction of its project to serve West Coast markets. The certificate was contingent upon completion of environmental review and the issuance of a final order. It became effective in January 1989. Court review is pending. In May 1989, the Commission issued Mojave its optional certificate to serve West Coast markets. Green Canyon received an optional certificate in June 1989 to facilitate the entry of new offshore gas supplies into the marketplace. There were seven optional certificates pending Commission review at the end of FY 1989.

Besides the optional certificates, the Pipeline Certificate staff has been processing major proposals for expanding pipeline capacity. These proposals involve large sums of money and tremendous volumes of new capacity. Moreover, the applications involve complex market issues and raise sensitive environmental issues. The Commission's efforts to expedite processing these applications is demonstrated by the progress it made in completing the Northeast projects under compressed deadlines.

To expedite the completion of the Northeast Projects, the Commission used the environmental support services of a contractor. As a result, the Commission made substantial progress in the preparation of major environmental impact statements on the projects resulting from the Northeast Open Season settlements. Many other proposals involve sensitive environmental issues which must be thoroughly analyzed. Consequently, the Commission will continue to require the support services of an environmental contractor to help in preparing impact statements.

Another major project is the development of offshore gas reserves and the establishment of a transportation network to move the gas from the Mobile Bay Region of Alabama to market. The Mobile Bay Region represents the largest domestic discovery of natural gas since Prudhoe Bay, with estimated reserves of over 5 trillion cubic feet.

Considering the importance of the Mobile Bay discovery, the Commission initiated an open season. The Commission required that pipelines seeking to have certificates related to development of Mobile Bay by the end of 1990 file applications with the Commission by December 30, 1988. The Commission received 15 applications. In April 1989, one application was withdrawn. The remaining 14 applications seek construction and operation certificates to transport gas produced from Mobile Bay. The 14 applications propose almost 1,000 miles of pipeline, 6 billion cubic feet per day of capacity, and will cost $700 million.

The Pipeline Certificate staff must thoroughly analyze the gas supply, environment, and possible competitive issues that the applications raise.

Capacity Brokering

In April 1988, the Commission issued a Notice of Proposed Rulemaking (NOPR) to allow holders of firm transportation capacity to sell those rights. Capacity brokering is one of several approaches that can effectively allocate the space in pipelines. Capacity brokering involves two general types of transactions: (1) pipelines assigning firm capacity they have on other pipelines; and (2) pipelines permitting shippers to assign firm capacity that they have on that pipeline. The purpose of the program is to increase the access to firm transportation for all sectors of the gas industry.

As a way of fully implementing the open access program, the Commission has authorized certain pipelines and customers with excess capacity to sell the capacity to others. The NOPR stated that all segments of the natural gas industry could benefit from a brokering program. Residential and industrial users of gas would no longer pay for capacity reserved for them on the pipeline which they do not need, and pipelines would enjoy the economic benefits of increased throughput. Those in the market for firm transportation service would be able to obtain that service rather than the less valuable interruptible service.

The Commission held a technical conference in July 1988 and received supplemental comments in September. Issues identified included the need for certification of rebrokers, a precise description of what is to be brokered, ultimate responsibility to the transporter, and a price cap for rebrokers. By Order issued in August 1989, the Commission authorized Texas Eastern to implement a capacity brokering program for a 10-year term.

Since it established general guidelines for the program, the Commission has received eight requests seeking approval of capacity brokering. It has approved four program proposals. One approved proposal was not accepted by the applicant. There were four proposals awaiting the Commission's consideration at the end of FY 1989.

Abandonments

Under Section 7(b) of the Natural Gas Act, once interstate natural gas service has commenced, it can be abandoned only after the Commission has found that permitting abandonment is in the public convenience or necessity, regardless of the term of the underlying contractual arrangement.

Until recently, the method for determining the "public convenience or necessity" was to weigh the relative needs of competing pipeline purchasers and their ultimate consumers. In 1978, the NGPA eliminated the dual intrastate and interstate gas market and elevated the role of the market in allocating supply and determining the price of gas at the wellhead. Since the passage of the NGPA, the Commission has gradually modified its abandonment policy.

The Commission adopted a generic abandonment policy in 1988 by issuing Order No. 490. The Order permits both first sellers and jurisdictional pipeline purchasers to abandon their sales or purchases when the underlying contracts have expired, are terminated in accordance with a provision of the contract, or are mutually terminated or modified. The rule provides that if the first seller and the pipeline purchaser mutually agree to terminate a contract, or the contract has expired on its own terms, abandonment is authorized for either party upon 30 days written notice to the other party. A report must be filed with the Commission within 30 days of the date that the sales are terminated. Only pipelines with blanket transportation certificates may use the unilateral authority if the seller opposes the abandonment. Parties may still seek abandonment under Section 7(b) if they cannot meet the requirements of Order No. 490. After January 1, 1993, when the producer decontrol process is completed, there will no longer be any need for abandonment since all gas will be deregulated.

This procedure contrasts with the existing case-by-case approach which requires that an application be filed, noticed, and approved before the abandonment is effective. Even in this program area, large numbers of conversion abandonments were filed in FY 1989 and should continue to be filed in FY 1990 and 1991 as pipelines, suppliers, and their customers restructure the relationships not

covered by Order No. 490. Facilitating abandonment will enhance flexibility in the market with the result that the Nation's entire gas supply can be more efficiently utilized to satisfy consumer needs.

Fair Market Practices

The Commission adopted the marketing affiliates rule (RM87-5) in June 1988. The rule guards against pipelines favoring their marketing affiliates in providing transportation services. It established standards of conduct and automated reporting requirements intended to prevent preferential treatment of an affiliated marketer by an interstate pipeline in providing transportation services. The rule requires pipelines to report information on transportation requests involving marketing affiliates. A pipeline must keep the same information for transportation requests in which nonaffiliated shippers are involved, but is not required to file that information with the Commission. On December 13, 1989, the Commission extended through December 1990 the reporting requirements for affiliate transactions.

Import/Export

The most recent development in the import area involves short-term or spot sales from Canada. Pipelines, distributors, and end-users have contracted directly or through brokers with Canadian producers. Under Order No. 500, some imported spot-market gas can move under self-implementing authority. In addition, the Commission has processed a number of applications wherein pipelines have sought Section 7 authority to transport these Canadian supplies.

The importation of LNG from Algeria was discontinued several years ago. Distrigas Corporation has reached an interim agreement with Sonatrach, the Algerian Government's exporting authority, for the resumption of LNG deliveries to the Everett, Massachusetts, facilities. The first shipload of this renewed trade arrived in January 1988. In March 1988, FERC issued an order to Distrigas approving five shiploads of LNG to be delivered within a specified period of time. In September 1988, the Economic Regulatory Administration approved the importation of up to 17 cargoes of LNG annually for a term ending on October 1, 2003. An application filed by Distrigas in July 1988, requested authorization for a major restructuring of services to permit a broad range of flexible, market-responsive LNG services to existing and new customers. All prices and rates for services will be negotiated with each customer. The Commission approved the proposal by Distrigas in December 1988, but required that the resale rates be subject to caps designed to ensure they are just and reasonable and otherwise do not give Distrigas a competitive advantage over other companies serving the region.

Importation of LNG to the Lake Charles, Louisiana, and Cove Point, Maryland, LNG terminals, inactive over the past few years, is planned to resume. Trunkline LNG Company requested authority for a limited LNG terminal service for Pan National Gas Sales, Inc. which currently has limited-term authorization from the DOE to import into the United States and is seeking authorization for

a 15-year contract to import LNG which will be resold to Citrus Corporation. The Commission, on November 14, 1989, issued Pan National certificates to make sales for resale and to Trunkline to provide the LNG terminal services for Pan National and others at the Lake Charles, Louisiana, facility. Columbia LNG Company has announced its intention to file applications in early 1990 to recommission its import terminal at Cove Point, Maryland, and to provide related services.

Yukon Pacific Corporation (Yukon Pacific) filed applications before both DOE and FERC for export authorization to export LNG from Alaska and for a place of export, respectively. The DOE authorized the application on November 16, 1989. The Commission has not yet acted on Yukon Pacific's application.

In the area of gas import/export activity between the United States and Mexico, a major application to construct and operate pipeline facilities in five different segments across the U.S./Mexico border was filed at the Commission in August 1988. These segments would connect to a pipeline that will be constructed in Mexico to transport gas to California markets. The pipeline in Mexico will transport gas from wells in the Gulf Coast and Texas.

Additionally, staff has received inquiries regarding new projects for exports of gas to Mexico, and the DOE has received a number of applications requesting short-term blanket export and import authority.

Curtailments

Title IV of the NGPA required the Commission to restructure priorities in order to give special consideration to agricultural users thus allowing them to meet the requirements of full food and fiber production. As a result of this continuing requirement, the staff annually reviews the updates of the gas requirements of essential agricultural users and the determinations of the availability of alternative fuel even when no curtailment is anticipated.

Staff anticipates that increased transportation under Order No. 500 procedures and a concurrent conversion in sales obligations will change curtailment plans and proportionately increase filings and proceedings. Order No. 500 provides that pipeline customers may have natural gas transported in lieu of the volumes traditionally purchased from a pipeline. The customer has the option of having the contract demand volume associated with the pipeline purchases converted to transportation entitlement by a specific percentage each year. As a result of this contract demand (CD) conversion program, a pipeline's obligation to serve all or portions of a customer's market during periods of curtailment will change. Title IV of the NGPA requires that a pipeline tariff provide for the protection of certain high priority users during curtailment. As more pipeline customers choose the options of CD conversion under the pipeline's blanket transportation authority, the affected pipelines will have to adjust their curtailment plans and/or CD levels to reflect the change in market profile and service obligation. This could change the make-up of the curtailment workload and, considering the contentious nature of curtailment proceedings in the past, could result in some prolonged formal hearings.

FY 1989 Accomplishments - Pipeline Certificates

- Issued final rules in data collection and Outer Continental Shelf carriage.
- Completed action on marketing affiliates filings.
- Completed action on Order No. 436/500 proposals filed by major pipelines.
- Reorganized the environmental staff to enhance efficiency, achieve expeditious processing of docketed casework, and to increase effort in the post-certification review of environmental impact mitigation measures required in certificates.
- Conducted biennial cryogenic design and technical reviews of jurisdictional LNG facilities with emphasis on operational reliability and assurance of service.
- Issued blanket authorization to United Gas Pipe Line Company to permit capacity brokering on third-party pipelines.
- Issued blanket authorization to Texas Eastern to permit capacity brokering on its system.
- Issued blanket authorization to ANR Pipeline Company for contract storage service.
- Authorized transportation transactions under Section 7(c) for those pipelines awaiting Orders No. 436/500 certificates or opting not to participate in the Order Nos. 436/500 program.
- Issued 18 orders granting certificates for Northeast pipeline projects identified as proposals to serve discrete markets, and facilitated a settlement of issues in the remaining competitive proposals.
- Conducted a technical conference on Mobile Bay projects.
- Issued optional certificates for WyCal and Mojave enhanced oil recovery (EOR) projects. Completed briefing process for the hearings associated with the Kern River EOR project.
- Issued an optional certificate to Green Canyon in June 1989 pursuant to procedures adopted in Order No. 436 aimed at facilitating entry of new supply into the marketplace.
- Acquired additional pipeline flow computer analysis capability and expanded its use in evaluating pipeline certificate applications and capacity utilization studies.

- Prepared and issued a joint final environmental impact statement/report in conjunction with the California State Lands Commission for the Wyoming-California Pipeline Company EOR project.. Initiated similar joint arrangement with the California Public Utilities Commission to commence joint environmental studies for other projects which will transport gas to California EOR and non-EOR markets.

- Completed environmental assessments for nine major pipeline projects. They are: (1) APEC Project; (2) NOREX Pipeline Project; (3) New Jersey/ Providence Project; (4) Florida Gas Phase II; (5) Providence; (6) SS-2 Storage Service Project; (7) Midland Cogeneration Venture Pipeline Project; (8) TransCanada Pipelines, Ltd. Project; and (9) United Curtailment Project. Completed final Environmental Impact Statement on Ocean States Power Project.

- Began preparation of five major impact statements and twelve major environmental assessments.

- Held environmental scoping meetings on the Northeast projects (Iroquois/ Tennessee and Champlain) in Connecticut, New Hampshire, New York, and Vermont. Held coordination meeting for the Northeast projects with state and federal agency representatives.

Pipeline Certificate Workload

Pipeline Certificate workload is summarized in Tables 3 and 4. Overall, receipts are estimated to decrease slightly from FY 1989 to FY 1991. During the same time frame, prior notice filings are projected to remain at the sustained high level experienced during FY 1988 as a result of the open-access services performed under the blanket certificate transportation program. Import/export filings will drop from 55 to 30 as a result of the completion of the Northeast Projects. During FY 1991, several significant projects such as Mobile Bay and proposals to serve the California markets will take up large portions of staff time and environmental contract funding. Post certificate field reviews of pipeline construction work and environmental conservation measures will be performed by staff in addition to work done in the ongoing cryogenics facilities safety inspections program.

Table 3 - Pipeline Certificate Workload

	Receipts			Completions		
	FY 1989	FY 1990	FY 1991	FY 1989	FY 1990	FY 1991
Construction and Operation (Nonformal)	255	275	275	280	280	280
Construction and Operation (Formal)	10	3	3	6	6	6
Prior Notice Proceedings	1,788	1,800	1,800	1,741	1,800	1,800
Import/Export Related	55	30	30	51	60	60
Curtailment Plans	22	24	24	26	24	24
Abandonment	173	140	140	108	145	145
Total	2,303	2,272	2,272	2,212	2,315	2,315

Table 4 - Workload Pending at End of Fiscal Year

	FY 1988	FY 1989	FY 1990	FY 1991
Construction and Operation (Nonformal)	244	219	214	209
Construction and Operation (Formal)	25	29	26	23
Prior Notice Proceedings	164	211	211	211
Import/Export Related	72	76	46	16
Curtailment Plans	15	11	11	11
Abandonment	88	153	148	143
Total	608	699	656	613

Pipeline Rate Regulation

	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request
Operating Expenses	$27,553	$28,300	$29,743

Goals of the Pipeline Rate Program:

- Establish just and reasonable rates for the interstate transportation and sale of natural gas for resale under the NGA.
- Establish fair and equitable rates for intrastate pipelines and distribution companies performing services under Section 311 of the NGPA.

Specific Objectives for FY 1991:

- Conduct formal proceedings expeditiously to minimize collections of revenues that would have to be refunded at some future date.
- Conduct formal hearings as deemed necessary to assure that gas cost flow-throughs are in accord with all regulatory and statutory requirements.
- Conduct streamlined hearing procedures, where appropriate, to expedite processing of gas inventory charges.
- Expeditiously address the rate design initiatives discussed in the Commission's Policy Statement Providing Guidance with Respect to the Designing of Rates, issued in May 1989, designed to promote economic efficiency in more competitive natural gas markets.
- Fully implement the provisions in Order No. 493, the final rule which requires pipelines to file forms, rate filings, certificate applications, and tariffs by electronic media.
- Increase use of hardware, software and computer techniques for review and analysis.
- Provide training and resources to enable existing staff to retrieve and analyze data filed on electronic media.
- Continue analysis and review of Order No. 500 cases where all data are available and final determinations can be made on pass-through and prudence of take-or-pay costs.
- Emphasize settlements of controversial issues to the extent practical and appropriate.

- Conduct hearings as needed on the pass-through of costs for take-or-pay buy-out/buy-downs and contract reformation.

- Ensure that rate refunds are timely and properly computed and distributed.

- Administer the Uniform System of Accounts and a program of financial audits.

- Conduct pipeline company on-site review to insure that the new rate design proposals are adequately substantiated.

Under this program, the Commission is responsible for the regulation of approximately 150 natural gas pipelines which sell and transport gas in the interstate market. The NGA requires that the Commission ensure just and reasonable gas rates to provide interstate natural gas pipelines a fair rate of return on their investment and, at the same time, protect consumers from being charged excessive rates or from being subjected to unduly discriminatory treatment. Natural gas pipeline rates are regulated through various filings for certificated rates, rate changes, rate refunds, and purchased-gas adjustments (PGAs).

Enactment of the Natural Gas Policy Act (NGPA) substantially increased the workload due to the addition of rate jurisdiction over certain intrastate pipeline transactions. The Commission was given the responsibility for ensuring that rates and charges by intrastate pipelines for transactions under Title III of the NGPA are fair and equitable.

Over the past several years, competition and market forces have increasingly replaced the regulatory framework of the Commission with regard to the natural gas industry. Long-term contracts with fixed pricing and take-or-pay provisions are no longer the predominant basis for developing pipeline purchasing strategies. The Commission is continuing to implement initiatives and policies to address many of the issues the industry faces in coping with this competitive environment, such as capacity brokering, open-access transportation on the outer continental shelf, a gas inventory charge program, standby charges, new rate design methodologies, and the on-going natural gas data collection effort which will allow the development of an information base to monitor industry activity.

In April 1988, FERC issued Order No. 493 which required that certain forms filed by the natural gas pipeline companies be filed on electronic media effective November 30, 1988. Order No. 493-A extended the implementation dates for electronic data submission of other forms until April 30, 1989, and also extended the implementation dates of electronic data submission on rate, tariff, and certificate applications until October 31, 1989. This has necessitated an analysis of information requirements. Among these requirements are the development of data bases and models to assist the pipeline rates staff; the management and maintenance of energy information utilizing contractor support; the training of in-house staff; and the preparation of reports for use by the Commission, staff, and the public. The Commission is working on meeting its deadlines to accept and utilize the filings in an electronic form.

Rate Filings

Staff analyzes each rate filing and certificate application to determine the rate implications upon the pipeline and its customers. In carrying out this function, analyses are performed to determine whether the proposed rates and charges are consistent with the Commission's statutory responsibilities, policies, case precedents, and the regulations affecting rates, charges, and service conditions.

Section 311 of the NGPA put in place a program to facilitate the movement of gas between interstate and intrastate markets. This permitted the gas market to respond to market forces and gas industry participants to react quickly to changing competitive market conditions. The Commission's blanket transportation program expanded the ability of industry participants to respond to changing market forces and has been instrumental in relieving surplus market conditions. With virtually all major interstate pipelines operating under open-access blanket certificates, the program is maturing and the Commission expects the number of blanket transportation transactions to stabilize.

Implementation of Order No. 436 has raised numerous new issues which require resolution. The Commission has answered these in two ways. First, by developing programs that extend the deregulatory spirit of the NGPA and accommodate the development of a market-based industry. Second, it has addressed the issues and concerns the court expressed when it remanded Order No. 436 in 1987 by adopting a series of interim rules in Order No. 500 and adopting a final rule in Order 500 on December 13, 1989.

For example, in Order No. 509, the Commission instituted open access on the outer continental shelf. The offshore pipelines were required to file rates consistent with Part 284 of the Regulations to the extent such rates were not on file. Staff will continue to process these filings to ensure that pipelines' tariffs are consistent with the open-access transportation requirements of Order Nos. 436/500.

The new program requirements of open access on offshore pipelines and pipelines' attempt to implement proposals reflecting regulatory initiatives which are not yet fully developed, has caused substantial increases in the levels of nonformal rate and tariff filings and the need for frequent repeat filings. The Commission expects this experience to continue as new regulatory initiatives are implemented.

Take-or-Pay

In the interim rules of Order No. 500, the Commission created an alternate method of take-or-pay recovery called the equitable sharing mechanism. Under the equitable sharing mechanism, pipelines recover from their customers certain take-or-pay costs. They also recover the costs of reforming contracts to make the contracts consistent with current market conditions. This method is available only to pipelines holding a blanket certificate for open-access transportation. Under the interim rule, pipelines had to file for the equitable sharing-mechanism by a certain date.

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In return for a pipeline's agreement to absorb from 25 to 50 percent of its take-or-pay costs, the pipeline may recover from its sales customers through a fixed charge a percentage of take-or-pay costs equal to the percentage of take-or-pay costs which the pipeline absorbed. Remaining take-or-pay costs, up to 50 percent of the total, may be recovered through a charge on each unit of gas delivered to both sales and transportation customers.

The Commission issued a decision on most of the proposals it received for the equitable-sharing program. Through negotiations, pipelines have resolved over $44 billion in take-or-pay liability and contract reformations at an expenditure of $8.6 billion. Of this total amount, the pipelines will absorb 39 percent, direct bill approximately 39 percent, and recover the remaining 22 percent through a volumetric surcharge which each pipeline will base on its total pipeline throughput.

On October 16, 1989, in American Gas Association v. FERC, the U.S Court of Appeals for the District of Columbia Circuit remanded Order No. 500 to the Commission. The Court primarily directed the Commission to provide additional reasoned support for the treatment of take-or-pay matters in Order No. 500. In December 1989, the Commission issued a final rule in Order No. 500. The rule establishes a permanent open-access, nondiscriminatory gas transportation program and addresses the Court's concerns about resolution of take-or-pay issues.

Further staff time will be needed to conduct technical conference proceedings and, in some cases, conduct formal hearings on the take-or-pay filings. Many of these filings may generate multiple filings as downstream pipelines file to track their billing by upstream pipelines.

Gas Inventory Charges

In an effort to prevent a recurrence of the substantial take-or-pay obligations recently experienced by interstate pipelines, the Commission has created a gas inventory charge (GIC) mechanism which would compensate the pipeline, on a current basis, for potential future take-or-pay liabilities. The gas inventory charge is designed to avoid any future unfunded take-or-pay costs and provide the pipeline clear signals on how to manage its gas supply contracts so that the pipeline's customers have adequate gas supplies on-call.

On May 30, 1989, the Commission issued a Notice of Proposed Policy Statement on Interim Gas Supply Charges and Interim Gas Inventory Charges (NOPPS). The NOPPS explores the possibility of implementing interim GICs while a pipeline's application for a permanent GIC is being analyzed and processed. The Commission received approximately 100 comments in response to the NOPPS. All segments of the industry responded. Not surprisingly, the comments ranged from being supportive to being adamantly opposed to the idea of a generic interim GIC. The final rule Order No. 500 establishes a permanent GIC program.

To expedite the processing of permanent GIC applications, the Commission has instituted "paper hearing" procedures. The paper hearings are designed to shorten the review and decisionmaking time substantially. They do this by

conducting the proceedings through direct written correspondence with the applicant, instead of in a formal hearing before an Administrative Law Judge. It is expected that GICs in paper hearing can be processed in months, whereas it could take years if formal hearings are held. For example, on April 27, 1989, the first paper hearing was established for the contested GIC application of El Paso Natural Gas Company. On November 29, 1989, the Commission issued El Paso a GIC certificate.

Since instituting the paper hearing procedure for the El Paso GIC application, the Commission has established similar procedures for the GIC applications of four pipelines (Transco, Tennessee, Natural, and Southern). The Commission instituted formal hearing procedures on two other GIC applications (National Fuel and Northern Natural), because the proposals were significantly related to rate cases that had already been set for formal hearings.

Four pipelines (Natural, Northern Natural, Texas Gas, and Kentucky West), have sought to implement GICs on an interim basis. Although none of these applications conform strictly to the mechanisms proposed in the NOPPS, they have been modified purportedly to address the individual needs of the applicants. Each proposal has been protested by both the pipelines' sales customers and independent shippers and marketers. The issues raised by these protests may not be easily or quickly resolved. Each application will have to be analyzed on a case-by-case basis.

Rate Design

In its Policy Statement Providing Guidance with Respect to the Designing of Rates issued May 30, 1989, the Commission made clear its intent to implement the rate design objectives set forth in Part 284 of the Regulations with respect to all rates charged by interstate pipeline companies. The Policy Statement identified 39 specific proceedings pending before the ALJs to which the Statement would apply. In addition, the Commission has directed that all rate increase filings which companies have made since May address the issues in the Statement. The Commission stated that it intended to apply its principles to cases pending before it on a case-by-case basis.

The Policy Statement will help participants develop factual records on which the ALJs and the Commission can fashion comprehensive rate designs which are tailored to particular pipelines and fulfill the intent and mandates of the NGA and the NGPA.

In the Statement, the Commission provided guidance for developing rates that promote economic efficiency. Specifically, it addressed the following areas: seasonal rates, demand charges, maximum interruptible rates, discounted rates, and rate unbundling. The Policy Statement makes clear that the Commission's rate design objectives for open access transportation apply equally to sales services.

The Policy Statement is expected to generate innovative rate design proposals which will require close scrutiny by Commission staff to ensure that they achieve the desired results and are consistent with Commission policy directives. The Commission staff will be addressing these issues on a case-by-case basis and is relying on the availability of automated procedures to expedite its analysis.

The Commission also is studying rate design approaches which give pipelines stronger incentives for efficient operation. A key feature of the incentive-based approach is an automatic rate adjustment mechanism which allows pipelines and consumers to share any cost-saving gains without a comprehensive rate proceeding. The program also calls for greater pricing flexibility which should enable pipelines to compete more effectively when market conditions change. Finally, incentive regulation also calls for a long-run sharing of pipeline efficiency gains which should enhance cost-saving behavior. The staff may need to address and implement incentive regulation programs.

Open Access Transportation

The Commission's open-access transportation program instituted by Order Nos. 436/500 is reaching maturity. Virtually all major interstate pipelines are now open, and the level of filings made under blanket transportation certificates has stabilized. The level of transportation transactions is expected to remain consistent with recent experience, assuming the continued availability of competitively priced supplies through the spot market.

Tracking Filings and Reviews of Purchased-Gas Adjustment

The Commission investigates proposed rates and services. The NGA requires that tariff rates and charges be just and reasonable and not unduly discriminatory. These requirements protect consumers from abuses of market power and ensure that the pipelines are compensated for prudent and necessary service costs--including a fair return on investment.

In general, the Commission uses a historical costing approach in rate cases filed under the NGA. Recorded costs follow the Uniform System of Accounts. Pipeline companies file for rate changes based on a 12-month historical period and adjusted for the known and measurable changes expected to occur over the succeeding nine-month period. The Commission then has 30 days to accept the filing, reject it, or to suspend the effectiveness of rates for up to 5 months. If the Commission suspends the filing, the rates may go into effect after the suspension subject to refund, with interest, for any amounts ultimately found not to be just and reasonable through the Commission's adjudication procedures.

Purchased gas costs are a major expense for gas pipelines. Under the NGA and the NGPA, the Commission must assure that purchased gas costs are just and reasonable, nondiscriminatory, pass the fraud and abuse standards and the affiliated entities test established by the Commission.

In Order No. 483, the Commission adopted its regulations on purchased gas-cost adjustments (PGAs) to allow pipelines to better respond to rapid changes in the gas market. The major changes implemented in this final rule were:

- more frequent changes in current adjustment-rate charges (four per year);
- the opportunity to change rates as often as daily provided certain requirements are met;
- requirement of a fully supported and justified filing, including an annual surcharge adjustment that is filed annually;
- a requirement that PGA filings be submitted on electronic media; and
- standardization of filing procedures by natural gas pipelines.

The final regulations place great weight on annual staff reviews of filings to ensure compliance. The Commission accesses and analyzes the PGA filings through personal computers. Field reviews focus on potential problems identified during the review of a PGA filing and filings related to it.

About 55 pipelines make PGA filings with the Commission. The Commission performs field reviews of specific companies on a cyclical basis.

By making the filing requirements for PGAs more specific, the Commission has reduced the number of filings which enter the adjudicatory process for approval. However, because some pipelines prefer to use non-standard approaches in their PGAs, the number of PGA filings which go to hearings and must be processed individually will offset the decrease of PGA filings under Order No. 483 and hold steady the number of formal cases filed through FY 1991.

Interstate pipelines made 115 formal rate change filings during FY 1989, involving $571 million. These filings continued to be based on increases in overall operating costs and the impact of changes in the natural gas industry.

Financial Audits - Gas Pipeline Companies

An essential element in the Commission's Natural Gas Regulation program is the existence of reliable financial accounting information which is based upon sound accounting principles that are uniformly applied to all jurisdictional companies. This accounting information is necessary in order to provide the Commission the information it needs on investment costs of facilities, the cost and types of capital used to finance such investments, and operating costs and revenues in order to establish just and reasonable rates under Section 4 and 5 of the Natural Gas Act and to determine compliance with the rate schedules on file. These needs are essentially met through the establishment and maintenance of a Uniform System of Accounts for Gas Companies, through requirements for periodic financial reporting, and through a program of financial audits of jurisdictional companies. These functions are carried out through authorities granted under Sections 6, 8, 9, and 10 of the Natural Gas Act.

The accounting information obtained from financial statements prepared under standards uniformly applied to all regulated natural gas companies forms the basis for measuring both historical economic performance and compliance of billing practices to the terms of approved tariffs. Additionally, the accounting information is used to determine the adequacy of current rates and provides the foundation for constructing ratemaking models useful for the development of future rates.

The required assurances that the Commission must have that the basic financial information used in its economic regulation is sound and reliable is obtained essentially through a program of financial audits. These audits are conducted on a cyclical basis. Approximately 60 percent of the 141 natural gas companies subject to the Commission's accounting regulations are audited on a 4-year cycle. The remaining companies are audited more or less frequently depending upon such factors as the extent to which automatic adjustment clauses are used, the frequency of rate filings, and other similar considerations. The audits, which are conducted on-site by field auditors, encompass selected reviews of rate matters as well as audits of the basic financial statements and related books and records.

FY 1989 Accomplishments - Pipeline Rates

- Expeditiously processed all statutory filings and conducted numerous expedited litigated proceedings.
- Expedited formal hearings on complex innovative rate issues such as Gas Inventory Charges.
- Implemented the flexible PGA program that allows pipelines more market responsiveness to better reflect purchased gas costs.
- Implemented the new PGA filing requirements and electronic filing of these adjustments under Order No. 483.
- Installed the on-line purchased gas adjustment computer system which generates audit and analysis reports and recreates the PGA filing from the electronic data.
- Drafted the NOPR which proposed a capacity brokering program for interstate pipeline systems (Docket No. RM88-13-000).
- Processed take-or-pay filings permitted by Order No. 500 and began the full-scale review of the filed supporting data for the take-or-pay flow-through costs.
- Approved the Gas Research Institute's research and development budget for 1989 and reviewed its 5-year plan.

- Instituted open-access on the outer continental shelf through Order No. 509 (Docket Nos. RM88-14-000 and RM88-15-000), which granted open-access blanket transportation certificates to offshore pipelines. Instituted rate proceedings where necessary to ensure consistency of rates, operating terms, and conditions of OCS pipelines with Part 284 of the Commission's Regulations.

- Issued a Policy Statement Providing Guidance with Respect to the Designing of Rates which directs the parties to address, on a case-by-case basis, issues including seasonal rates, demand charges, maximum interruptible rates, discounted rates, and rate unbundling.

- Approved a gas inventory charge for Texas Eastern Transmission Corp. Instituted streamlined hearing procedures to expedite processing of gas inventory charges filed by El Paso Natural Gas Co., Transcontinental Gas Pipe Line Corp., and Tennessee Gas Pipeline Co.

Pipeline Rate Workload

Workload in the Pipeline Rate program consists of rate change and rate change tracking filings (nonformal and formal), refund filings, compliance filings, NGPA transportation transactions filings, and field reviews.

The increase in Rate Change Formal NGA Sections 4 and 5 rate cases for FY 1990 and FY 1991 reflects filings associated with the implementation of gas inventory charges and rate regulation programs. The complexity of these cases will increase as a result of the Policy Statement Providing Guidance with Respect to the Designing of Rates, issued on May 30, 1989, which will require staff to address issues such as seasonal rates, maximum interruptible rates, discounting, unbundling, etc. Automated processing procedures, including an effective Cost-of-Service Module, efficient use of electronically filed data stored on the mainframe, and enhanced staffing levels will be required for expeditious processing of these cases.

Receipts of Rate Change Nonformal NGA Section 4 and initiation of Section 5 filings are expected to decline, but to stabilize at relatively high levels in FY 1990 and FY 1991. This reflects the expectation that activity in these years will be consistent with recent experience. This category will continue to experience new and associated repeat filings made pursuant to Orders No. 436/500, 509, and the Policy Statement Providing Guidance with Respect to the Designing of Rates.

Receipts of nonformal Order No. 500 related tracking filings is experiencing dramatic growth due to the Commission's implementation of new initiatives and policies allowing the industry to respond in a timely manner to changes in the competitive environment. This pattern is expected to continue with the inclusion of tracking items required as a result of rate design initiatives and the implementation of gas inventory charges.

In the Rate Change Tracking (Formal) area, the process of converting to the new PGA provisions has resulted in continuing lower levels as experienced in FY 1988. This trend for receipts and completions is expected to continue in FY 1990 and FY 1991.

Order No. 493 revised the methodology for computing refunds. The trigger level established for disbursement has produced a major downturn in the number of filings, but the nature of the filings are requiring an increased level of staff work because of their complexity.

Due to the maturation of the blanket certificate program, filings associated with transportation transactions are expected to stabilize in FY 1990 and FY 1991.

Completions for PGA Field Reviews continued at a reduced level in FY 1989 due to the implementation of the new electronic filing system and industry confusion. Staff has not been available for field review because of the heavy participation in the reviews of the electronic filing and Orders No. 500 and 509 filings. With the new computer system in place, staff will have the ability to perform more indepth reviews.

Completions in all workload categories are expected to keep pace with receipts in both FY 1990 and FY 1991, thereby continuing the trend of a reduction in the pending workload each year.

Table 5 - Pipeline Rate Workload

	Receipts			Completions		
	FY 1989	FY 1990	FY 1991	FY 1989	FY 1990	FY 1991
General Rate Filings	404	500	500	369	500	500
Rate Change (Nonformal)	821	658	658	822	714	668
Rate Change (Formal)	115	138	124	98	140	129
PGA Field Reviews	5	10	10	9	10	10
Rate Change Tracking (Nonformal)	766	600	600	737	615	615
Rate Change Tracking (Formal)	11	10	10	17	20	20
Transportation Transactions	4,886	5,208	5,208	5,044	5,208	5,208
Refunds	66	60	60	58	60	60
Staff Adjustments	6	5	5	5	5	5
Financial Audits	30	24	26	26	26	26
Contested Accounting Cases	1	1	2	1	1	1
Total	7,111	7,214	7,203	7,186	7,299	7,242

Table 6 - Workload Pending at End of Fiscal Year

	FY 1988	FY 1989	FY 1990	FY 1991
General Rate Filings	47	82	82	82
Rate Change (Nonformal)	268	267	211	201
Rate Change (Formal)	160	177	175	170
PGA Field Reviews	7	3	3	3
Rate Change Tracking (Nonformal)	73	102	87	72
Rate Change Tracking (Formal)	49	43	33	23
Transportation Transactions	265	107	107	107
Refunds	30	38	38	38
Staff Adjustments	2	3	3	3
Financial Audits	18	22	20	20
Contested Accounting Cases	2	2	2	3
Total	921	846	761	722

Producer Regulation

	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request
Operating Expenses	$ 7,447	$ 5,294	$ 3,508

Goals of the Producer Regulation Program:

- Prepare for full wellhead decontrol to be effective January 1, 1993.
- Ease the transition to full decontrol to include the review of the remaining Natural Gas Act certificate and rate filings now required of large and small producers and eliminate those that are not necessary.
- Provide adequate assurance that there are no regulatory disincentives for producers to develop and maintain a sufficient supply of natural gas during the transition to full decontrol.
- Process new natural gas producer applications where still required in a timely manner consistent with the Commission's responsibilities under the NGA and the NGPA.
- Ensure adequate review of sales subject to remaining certificate filing requirements to ensure that the proposed service is or will be required for public convenience and necessity.
- Ensure that prices for natural gas are established by the market to the maximum extent practicable.
- Ensure that prices for gas remaining under price control do not exceed the statutorily established maximum lawful prices.

Specific Objectives for FY 1991:

- Utilize the generic abandonment approach provided by Order No. 490 to provide automatic authorization to abandon sales and purchases where contracts have terminated or purchasers and sellers agree on sales.
- Process expeditiously those applications that fall outside the scope of the automatic procedures provided by Order No. 490.
- Increase utilization of computer systems to process applications for producer certificates and abandonments and reports more efficiently.
- Provide training for remaining producer staff to facilitate reassignment upon full decontrol.

- Ensure that prices for gas remaining under price control do not exceed the statutorily established maximum lawful prices.

- Ensure continuation of an effective NGPA well determination process and a cooperative relationship with state and Federal agencies involved in the determination process.

- Verify, through an effective field review program, that natural gas wells are properly classified and that lawful rates are being charged for regulated sales to protect consumers from overcharges.

- Continue to remove regulatory impediments to the operation of the natural gas markets by expanding the coverage of blanket authorizations, where appropriate.

Producer regulations were established in 1954 when the Supreme Court authorized the Commission's jurisdiction of the sales of gas in interstate commerce relating to the Natural Gas Act. Under these rules, natural gas producers must file applications for certificates of public convenience and necessity. These certificates authorize certain sales and resales of gas in interstate commerce. Many of these individual filing requirements have been replaced by the blanket authorizations.

As a result of the Supreme Court decision, the Commission established procedures to ensure just and reasonable rates for sales of natural gas in interstate commerce. Gas producers must file rate schedules detailing the terms, conditions, and rates for certain sales of natural gas. These rate schedules are available for public review. It is the Commission's responsibility to make sure that all rate changes, classification, or services provided for under the rate schedules fully comply with the law.

In 1973, the Commission began establishing producer rates on a nationwide basis. In spite of this, reserves declined and a severe shortage of gas in the interstate market developed. In response to the worsening gas supply situation, Congress enacted the Natural Gas Policy Act of 1978.

The NGPA of 1978 established a series of maximum lawful prices for all categories of natural gas sold in interstate and intrastate markets. The Act essentially held the price for gas from old wells constant. It provided for a series of incentive prices for gas from new wells and for hard-to-produce new gas. In order to collect the incentive prices under NGPA Sections 102, 103, 107, and 108, a producer must first obtain a determination that the gas to be sold actually qualifies for the incentive prices or for a decontrolled price.

In addition to establishing maximum lawful prices, the NGPA provided for a phased schedule which, in general terms, would ultimately decontrol most new gas. It would retain price controls on old gas until depletion. The first phase of the decontrol process began on November 1, 1979. At that time, price controls were removed from certain high-cost gas under Section 107. The most significant high-cost gas decontrolled in November 1979 was that gas produced

from wells completed below 15,000 feet. The price of additional volumes of gas was decontrolled on January 1, 1985. The last phase of the NGPA decontrol process occurred for production from certain shallow wells on July 1, 1987. Approximately 40 percent of wellhead sales remain under price controls.

In November 1985, the Secretary of Energy sent to the Commission for its action a proposed rule to reform the pricing structure for gas subject to ceiling prices under the NGPA. The DOE said that the NGPA pricing system for old gas inhibited efficient production of least-cost supplies of gas. The system, unless modified, would result in the loss of some 11 trillion cubic feet of old gas reserves. The DOE proposed that the Commission use its authority under Sections 104(b)(2) and 106(c) of the NGPA to establish a uniform ceiling price equal to the highest current ceiling price for old gas, that being the post-1974 price.

After reviewing comments from all segments of the natural gas industry, the Commission issued Order Nos. 451 and 451-A. These Orders established the post-1974 price as the alternative ceiling price for old gas under NGPA Sections 104 and 106. The Commission also adopted a "good faith negotiation" procedure. Under this procedure, a first seller whose contract allows the contract price to rise to a higher ceiling price may seek to renegotiate the higher price. If no agreement on price is reached, either party can terminate the contract. The Order granted blanket transportation authorization to pipelines which were not open-access transporters to make less difficult the transportation of abandoned or released gas.

On July 26, 1989, the Fifth Circuit Court vacated Order Nos. 451 and 451-A in Mobil Oil v. FERC. In December 1989, the Commission's request for rehearing was denied. The Commission is currently reviewing its options.

In FY 1988, the Commission issued Order No. 497 establishing regulations for interstate pipelines having marketing affiliates. The Commission received and processed numerous filings required by Order No. 497. Also processed were a large number of certificate applications filed by affiliated and nonaffiliated gas marketers. The final outcome of Order No. 497 and the extent to which coverage of blanket authorizations is expanded will determine the number of future filings.

Transition to Complete Wellhead Decontrol

Passage of the Natural Gas Wellhead Decontrol Act of 1989 deregulates all gas prices at the wellhead by January 1, 1993. It completes the process the NGPA began through its provisions for phased decontrol. In addition to decontrolling wellhead prices, the new legislation gradually removes all remaining Natural Gas Act certificate and rate filing requirements on and after January 1, 1993. In recognizing the gradual transition, the Committee in its conference report indicated that it expected the Commission to use its existing authorities "to streamline and simplify as much as possible the transition to complete wellhead decontrol, and to appropriately reduce

unnecessary filing, recordkeeping, and reporting requirements." However, the Committee also indicated that it expects the FERC and other agencies to continue to collect and publish all appropriate data, including wellhead pricing data and other natural gas-related statistics, which are necessary to a full understanding of the industry.

The Commission's FY 1991 budget reflects the declines in workload and shifts in staffing due to the Decontrol Act of 1989. Further review will be made to eliminate those workload categories in Producer Regulation which are no longer necessary in light of wellhead price decontrol.

Workload

The following sections contain a descriptive account of the workload required by the NGA and the NGPA. The categories reflect the declining workload of the Commission as it responds to the provisions of decontrol legislation.

New Service/Amendment

Producers of natural gas must file for certificates of public convenience and necessity to make certain sales for resale in interstate commerce. They must also file to amend an existing certificate to reflect changes in service or ownership. Receipts should decline as most filings become automatic under the procedures provided for in Order No. 490 or are removed from the Commission's jurisdiction as a result of decontrol.

Small Producers

An independent producer whose total "jurisdictional sales" do not exceed 10 Bcf per year and who is not affiliated with a major natural gas pipeline company may file a one-time application to cover existing and future sales. As fewer new sales become subject to the certificate requirements of the NGA, the applications that small producers will file will continue to decrease in FY 1991.

Abandonments/Termination

Producers are required to obtain abandonment authorization to cease the interstate sales of natural gas that are subject to the Commission's NGA jurisdiction. The number of abandonment applications increased because market constraints have forced pipelines to reduce purchases of available gas. This has encouraged producers to seek alternative markets for their gas. A high level of receipts in FY 1989 reflected continued restructuring in the natural gas industry as well as reluctance by producers to avail themselves immediately of the automatic abandonment authorization provided through the good faith negotiation procedures of Order No. 451. The Commission is considering its options in response to the court's denial of a rehearing on Order No. 451. The effect of these developments on workload in the producer abandonment program is unknown at this time.

Order No. 490, issued in February 1988, has significantly reduced the number of abandonment applications the Commission receives. The Commission's abandonment rule provides for automatic abandonment of sales or purchases where contracts have expired, been mutually modified, or are terminated. The order also grants blanket sales authority for resale of the abandoned gas. Furthermore, pipelines that have accepted blanket certificates under section 284.221 of the Commission's regulations are granted the right to unilaterally abandon purchases under expired contracts. The Commission no longer requires abandonment applications for cases meeting this criteria. This will reduce the number of applications received in FY 1990 and in FY 1991.

Rate Filings

Producer rate regulation was established for sales of gas in interstate commerce by the U.S. Supreme Court decision in 1954. This decision resulted in the Commission's establishing procedures to provide just and reasonable rates for sales of natural gas for resale in interstate commerce and for the filing of rate schedules detailing the terms, conditions, and rates for each sale of natural gas. According to Section 4 of the NGA, rate schedules and changes to rate schedules must be filed with the Commission and available for public inspection. It is the responsibility of the Commission to review all rates, charges, classification, or service provided under a rate schedule for compliance with statutes and Commission policy. Since the passage of the NGPA, evaluation of filed rate changes consists of verifying that the contractual authority to charge the new rate exists and determining that the rate is not higher than that permitted for the sale by the NGPA.

On June 6, 1986, the Commission issued Order No. 451 to establish a new ceiling price for "old gas" which was still subject to the Commission's regulation under Sections 104 and 106 of the NGPA and Section 4 of the NGA. As a result of Order No. 451, the number of filings temporarily increased as contracts were renegotiated. The court vacated Order No. 451 and denied the Commission's request for rehearing in December 1989. The effect of this development on workload in the Producer area is unknown at this time.

Staff Adjustments

In response to the requirement of NGPA Section 502(c), the Commission has established procedures for producers who wish to file for staff adjustments to prevent special hardship, inequity, or unfair distribution of burdens in the Commission's administration of the NGPA. Producer-related staff adjustment filings must be processed within 150 days of receipt. Staff also reviews and analyzes requests for adjustments allowed by the Commission's regulations on NGPA Section 110. Staff adjustment filings have primarily dealt with requests for waiver of refunds resulting from Commission orders concerning the method of Btu measurement required for NGPA sales.

Jurisdictional Agency Determinations

Under the NGPA, the 33 state or Federal jurisdictional agencies review applications containing geological and engineering information and production records to determine if the gas produced by a particular well satisfies the statutory criteria for the incentive pricing category requested by a producer.

The Commission is then notified of the determination for each application and notice of receipt is given to the public. The Commission has the authority to reverse a jurisdictional agency's finding or remand it for further consideration. However, the FERC review process is subject to a 45-day statutory limit.

Any determination not tolled, reversed, or remanded by the FERC within the 45-day period automatically becomes effective unless and until the determination is reopened and vacated because of reliance on an untrue or incomplete statement of fact. Since passage of the NGPA in 1978, the Commission has processed more than 430,000 determinations. With the elimination of all price regulation on January 1, 1993, there will no longer be a need for determinations after this date. However, FERC will continue to process the filings that are in the review cycle for the period when the well category determination is applicable.

Field Reviews

The FERC is responsible for ensuring that natural gas producers are adhering to the well category determination and pricing provisions of the NGPA. Implicit to this responsibility is the protection of consumers from overcharges. Under the NGPA regulations, reporting burdens are kept to a minimum and much of the compliance is accomplished through review of gas producing company records and pipeline transaction files. Producer Regulation staff helps the Commission meet this responsibility by conducting field reviews of approximately 500 jurisdictional agency determinations filed each year. It also initiates pricing investigations to ensure that producers are not charging unlawful rates.

Pricing investigations are based on a sampling process of sales involving gas subject to any of the eight general price categories of the NGPA. The importance of the investigations continues under phased decontrol. The investigations verify that the sales which gas companies claim to involve decontrolled gas are not subject to ceiling prices and that the sales of gas which the NGA has dedicated to the interstate market have not been improperly qualified for incentive price categories under the NGPA.

Through the field review program, the Commission monitors the charging of rates to ensure that they are proper and protects consumers from overcharges. The program is designed to minimize regulatory burden. It places maximum reliance on the good faith compliance of the natural gas companies. As of December 1, 1989, field and in-house reviews have resulted in refunds totalling more than $123 million. Following the January 1, 1993 decontrol cutoff, the field reviewing of the NGPA well category determination and price reviews will phase out.

Producer Refunds

The NGPA allows sellers of natural gas to collect certain ceiling prices on an interim basis pending a final well category determination. If a well does not qualify for the ceiling price, or if an application for a well category determination is withdrawn, producers must refund the over-collections. If a field review or other Commission order finds that the gas prices exceed the maximum lawful amount, the amount must also be refunded.

To ensure that refunds are made to the consumer, the Commission monitors all actions which could generate a potential refund obligation and follows up on the action to ensure that refunds are made. Staff extensively uses a computerized refund tracking system which contains significant amounts of information on events that could result in overcharges and create producer refund obligations.

Due to a court-mandated change in the method of the Btu measurement required for all NGPA sales, over $1 billion has been refunded by producers to pipelines. In turn, the pipelines pass these dollars through to their customers. The initial reports which the involved pipelines have filed indicated that approximately $171 million, including royalty refund obligations, was owed as a result of approximately 5,200 producer refund obligations, and had not been refunded. As of December 1, 1989, the outstanding Btu refund obligations had been reduced to approximately $33 million in 1,382 pending cases. In addition to the Btu refunds, over $372 million in NGPA refunds has been reported to the Commission as of December 1, 1989

Automation of the refund data in FY 1987 has enabled staff to respond more quickly in processing refund actions so that the refund workload will be on a current basis in FY 1990. In FY 1987, the first year in which the computerized refund tracking system was operational, pending workload in the refund area declined by 55 percent from more than 10,000 to less than 5,000 cases. The pending workload will be reduced to a working level of about 1,500 cases by FY 1991.

FY 1989 Accomplishments - Producer Regulation

- Extended marketer blanket certificates until March 31, 1990, for marketers affiliated with interstate pipelines and granted blanket certificates for an unlimited term for nonaffiliated marketers. These authorizations permit marketers to resell gas in the spot market.

- Instituted a system to compile and summarize data contained in the Order No. 451 annual reports.

- Dismissed applications which became unnecessary once Order No. 490 took effect.

- Continued implementation of the wellhead pricing provisions of the NGPA and the phased decontrol that occurred on January 1, 1985, and on July 1, 1987.

- Achieved significant success in the field review program, resulting in total refunds of over $123 million as of December 1, 1989.
- Ensured the flow through of over $250 million in NGPA refunds to date.
- Reduced pending workload in the refund area by about 30 percent.
- Issued final rule (RM88-10-000) to revise the definition for natural gas produced from Devonian Shale.
- Issued Final Rule to establish deadlines for first sellers to make and report refunds (Docket No. RM89-6-000, Order No. 515 issued August 3, 1989).

Producer Regulation Workload

The pending workload in the Producer Regulation program as shown in Table 8 projects a decrease of almost 68 percent from FY 1988 to the end of FY 1991. Total receipts and completions, as shown in Table 7, are expected to decline from the FY 1989 level. The most dramatic decreases in workload are reflected in the categories of (1) rate filings, which will be reduced almost sixty-five by FY 1991; (2) abandonments/termination (69 percent) and new service (55 percent), reflecting the anticipated impact of blanket abandonment and certificate procedures provided by Order No. 490; and (3) pricing investigations (67 percent), as the number of determinations filed falls from the high levels of prior years.

Under Order No. 490, producers receiving automatic abandonment must file reports with the Commission within 30 days of the abandonment. Also, Order Nos. 451 and 490 require annual reports, detailing sales which are initiated under the blanket certificate procedures provided by those orders. Issuance of these orders resulted in a large reduction in the amount of staff needed to review producer workload as the type of filings required have needed less analysis.

Further reductions are reflected in workload and staffing figures primarily due to wellhead decontrol.

Table 7 - Producer Regulation Workload

	Receipts			Completions		
	FY 1989	FY 1990	FY 1991	FY 1989	FY 1990	FY 1991
Small Producer	67	45	20	70	45	20
New Service	221	110	100	223	122	100
Abandonment/Termination	578	350	180	648	366	180
Rate Filings	1,416	535	500	1,530	535	500
JA Determination	12,145	6,000	4,000	13,141	6,500	4,500
Determination Review	550	500	500	550	500	500
Pricing Investigations	921	400	300	921	400	300
Refund Procedure	3,482	3,000	2,000	3,951	3,194	3,000
Staff Adjustment	3	10	10	10	10	10
Total	19,383	10,950	7,610	21,044	11,672	9,110

Table 8 - Workload Pending at End of Fiscal Year

	FY 1988	FY 1989	FY 1990	FY 1991
Small Producer	8	5	5	5
New Service	69	67	55	55
Abandonment/Termination	105	35	19	19
Rate Filings	150	36	36	36
JA Determination	2,236	1,240	740	240
Determination Review	0	0	0	0
Pricing Investigations	0	0	0	0
Refund Procedure	3,121	2,652	2,458	1,458
Staff Adjustment	9	2	2	2
Total	5,698	4,037	3,315	1,815

Federal Energy Regulatory Commission
FY 1991 Congressional Budget Request

HYDROPOWER REGULATION

Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request
Hydropower Regulation			
Hydropower Licensing - Operating Expenses	$12,167	$12,062	$15,282
Dam Safety and Inspections - Operating Expenses	10,015	11,299	12,583
Project Compliance & Administration - Operating Expenses	3,868	7,265	7,930
Hydropower Regulation - Total Operating Expenses	$26,050	$30,626	$35,795
FTE's	373	425	437

Authorization:

Hydropower Regulation: Federal Power Act; Public Utility Regulatory Policies Act; Department of Energy Organization Act; Energy Security Act; Regulatory Flexibility Act; Crude Oil Windfall Profit Tax Act; Pacific Northwest Electric Power Planning and Conservation Act; National Environmental Policy Act; Fish and Wildlife Coordination Act; Wild and Scenic Rivers Act; Eastern Wilderness Act; Wilderness Act; National Historic Preservation Act; Clean Water Act; Endangered Species Act; Coastal Zone Management Act; Federal Pollution Control Act; Niagara Redevelopment Act; Mining Claims Rights Restoration Act; Land and Water Conservation Fund Act; and Electric Consumers Protection Act.

Goals of the Hydropower Regulation Program:

- Ensure that licensed and exempted projects are constructed, operated, and maintained for the protection of life, health, and property.
- Ensure that licensed projects are best adapted to the comprehensive development of the Nation's waterways.
- Ensure that environmental concerns are fully addressed and reconciled before licenses and exemptions for hydroelectric projects are issued.
- Bring electric power generation from renewable resources on line in the shortest possible time and in compliance with applicable laws and Commission regulations.
- Ensure that licensees, potential applicants, and Federal and state agencies are informed of the Commission's existing relicensing regulations.
- Ensure that licensed and exempted projects are inspected in the construction, operation, and maintenance phases for the protection of life, health, property, and the environment.
- Ensure compliance with the requirements of licenses, exemptions, and preliminary permits.

Specific Objectives for FY 1991:

- Expedite processing of preliminary permits, exemptions, and new capacity licenses, consistent with a full examination of safety and environmental issues.
- Continue the relicensing outreach program, hold additional meetings with licensees, potential applicants, and resource agencies, and assist in providing guidelines for the preparation of complete applications for new licenses.
- Resolve disputes between agencies and potential applicants regarding the types of studies and other procedural requirements related to new license applications.
- Prepare for the large influx of relicensing applications scheduled to be filed in the first quarter of FY 1992.
- Maintain or improve the level of project supervision necessary to ensure a high quality dam safety and inspection program.
- Require the performance of full-scale emergency action plan tests at 12 major, multi-development projects.
- Conduct full-scale evaluations of more than 200 major projects to assess the structural integrity, maintenance, and instrumentation of major dam structures.

- Improve the ability to ensure full compliance with the terms and conditions stated in each license, exemption, and preliminary permit issued by the Commission.

- Investigate and bring into compliance violations of hydropower license and exemption requirements.

- Develop policy and procedures to implement the Project Safety Program.

Overall Workload Trends

The Commission's Hydropower Regulation program consists of three main elements: project licensing, compliance, and dam safety inspection.

A hydropower project can include multiple developments, each of which may contain a dam, reservoir, powerhouse or other facilities. The Hydropower Regulation program encompasses more than 1,750 hydropower projects, including both licensed and exempted projects, which represent over one-half of the Nation's hydroelectric energy generation. Hydroelectric projects supply about 9.5 percent of the electric energy generated in the United States. The development of hydroelectric power is consistent with achieving the goals of energy self-sufficiency, protecting against future escalation in oil prices, and using non-polluting, renewable resources that do not contribute to problems such as acid rain or the greenhouse effect.

The number of applications for new capacity hydroelectric projects and new capacity amendments to existing licenses peaked in FY 1985. Receipts in these two important workload areas have declined dramatically since the expiration of energy tax credits on December 31, 1985. While receipts for projects involving new capacity are expected to remain at relatively low levels through FY 1991, the applications remaining before the Commission in those two workload areas involve complex engineering, environmental and legal issues, and require a high level of staff effort to process workload and comply with the mandates of the Electric Consumers Protection Act (ECPA).

Furthermore, a high level of staff effort will be required to process pending applications for relicense, and to prepare for the approximately 170 relicense applications expected to be filed in the 3 months following the end of FY 1991.

Offsetting the decline in development applications in certain key areas of the Hydropower program are new compliance mandates and initiatives. The very large number of licenses issued recently will result in significantly increased workload in the processing of license amendments and license compliance activities. New program emphasis has been placed on ensuring compliance with Commission orders and regulations, and efforts will continue to compile compliance histories and to implement the penalty provisions provided for by ECPA in cases of noncompliance. As a consequence of these workload trends, additional staff and other resources will be needed. The administration of licenses in effect in FY 1991 will require a major effort on the part of the Commission in compliance-related activities.

Dam safety and inspections is the third component of the Commission's Hydropower Regulation program. Here, again, the large number of licenses issued in the recent past has increased the amount of inspection work that must be conducted. Dam inspections monitor the adherence of Commission licensees to all applicable safety requirements during the construction and operation of a project. Under the authority of Section 10(c) of the Federal Power Act, the Commission has responsibility for the inspection of more than 2,100 dams, an increase of 100 dams from the FY 1987 inventory and the resultant increased number of inspections required.

Management Initiatives

The Commission has initiated a number of improvements to make more efficient the processing of hydropower applications, the tracking of compliance requirements, and the maintenance of dam safety. Effects of these improvements will be carried forward into each new fiscal year, and greater emphasis is being placed on the development and implementation of new ideas for improving the Commission's productivity. The following items represent FY 1989 management initiatives:

- Issued a comprehensive rulemaking that significantly restructured the Commission's relicensing procedures, in fulfillment of major provisions of ECPA.

- Continued a major outreach program in anticipation of the filing of large numbers of relicense applications in the early 1990's. This program explains ECPA's requirements to prospective relicense applicants and resource agencies, assists in the resolution of questions related to study requirements, and should result in the filing of better applications for relicensing.

- Developed new procedures and staff guidance related to compliance workload to facilitate the management of the fastest growing component of the hydropower workload.

- Continued to eliminate various levels of Commission staff review by delegating additional decisionmaking down to the lowest reasonable level. More authority and responsibility have been given to first-line management.

- Utilized private sector firms for technical support in the preparation of environmental impact statements.

- Worked cooperatively with state agencies to promote dam safety and compliance actions.

- Published updated FERC Engineering Guidelines. The guidelines will promote more efficient and consistent resolution of dam safety problems.

FY 1991 Resource Requirements

The Commission is requesting $35,795,000 and 437 FTE's for the Hydropower Regulation program in FY 1991, an increase of $5,169,000 and 12 FTE's over FY 1990. The increase in funding is needed principally to support additional environmental contracting assistance. New staff is being requested to handle more complex licensing work, to process a rapidly growing compliance workload, to perform additional dam safety inspections, and to prepare for the relicensing applications to be filed in early FY 1992.

The requested staffing level in FY 1991 recognizes several changing characteristics of the Commission's hydropower workload: an increase in staff time required to process complex applications; more detailed analyses required to make licensing recommendations; many more applications requiring the preparation of environmental impact statements; significant increases in compliance-type workload resulting from the need to administer the provisions of recently issued licenses; the need to investigate and take actions on alleged violations of license provisions and Commission regulations; implementation of a civil penalties in appropriate cases; outreach requirements in preparation for relicense filings in coming years; and changes in the mix of dam safety inspections because of the large number of projects under construction or going into operation.

In short, the enhanced FY 1991 staffing level is appropriate for a program restructured to meet the mandates of ECPA--one that has moved away from the emphasis on new capacity filings that characterized much of the 1980's, firmly grounded in new regulations and implementing procedures, cognizant of the expanded need for compliance and inspections activities, and looking forward to a time in which relicense applications will once again change the makeup of the hydropower workload.

The resources requested will allow the Commission to implement all of ECPA's requirements in processing hydropower applications, and to prepare for relicense application filings. While the number of applications related to initial licensing will have stabilized, staff efforts will be devoted to performing the complex analyses required by ECPA so that the Commission can balance developmental and nondevelopmental interests in reaching its licensing decisions. Substantial contract funds are being requested to supplement staff efforts to conduct environmental analyses, thereby allowing for the development of a full decisional record. A portion of these contract funds will also be used to address significant cumulative impact issues that go beyond those that can be routinely considered as part of the application review process. The requested staff resources will also ensure that the Commission has the requisite professional staff to perform the full range of ECPA analyses, including assessments of comprehensive plans, evaluations of applicants' plans and abilities for proposed projects, identification of required enhancement and protection of environmental and other nonpower resources, and negotiations with state and Federal agencies in situations where agency recommendations are

determined to be inconsistent with the Federal Power Act and other applicable laws. Finally, a portion of the new staff resources will be devoted to making the preparations necessary to process the large number of relicense filings that will arrive in a short period of time.

At the requested FY 1991 staffing level, the Commission also will be able to complete initiatives undertaken in keeping with the changing nature of the Hydropower program. Staff will be dedicated to a proactive outreach program to work with prospective relicense applicants and resource agencies to explain the Commission's relicensing requirements and to assist in the preparation of new license applications. Staff's interaction with applicants and resource agencies should improve the quality of the many applications that must be filed with the Commission throughout the 1990's, with commensurate improvements in the eventual processing time of these applications. At the same time, contract funds will assist staff in making jurisdictional determinations, another program element that could result in increased licensing activity in future years. Bringing jurisdictional projects under license will help to ensure greater public safety and increased protection for environmental resources at presently unlicensed hydropower sites.

In recognition of the growing importance of a strong, consistent, and equitable compliance function, the Commission established an independent compliance structure within the Office of Hydropower Licensing. At the expanded funding and staffing level, the Commission will be able to handle its growing compliance workload, streamline procedures for efficiently processing license and exemption amendments, compile accurate compliance histories, and recommend appropriate penalties for various levels and patterns of noncompliance exhibited by licensees and exemptees. All of these initiatives respond to the changing circumstances and problems caused by the growth, both in number and complexity, of terms and conditions contained in Commission licenses and exemptions, and they recognize that compliance work will continue to be the fastest growing part of hydropower workload in the years ahead. At the same time, such initiatives also more fully utilize the administrative tools provided for in ECPA in order to ensure compliance with the Commission's orders and regulations.

Finally, the additional resources in the budget request will permit the Commission to maintain the effectiveness of its dam safety program. The number of inspections, which is directly related to licensing activity, has grown rapidly in recent years and is projected to continue increasing. New resources will be targeted to accomplish all of the required dam safety inspection activities. In addition, the Commission will expand the engineering reviews and evaluations necessary to support dam safety during the construction, operation, and maintenance of hydropower projects. As part of this effort, the Commission plans to require that licensees perform more full-scale tests of emergency action plans to check the adequacy of procedures, and to conduct comprehensive evaluations of structural integrity, maintenance, and instrumentation at major projects.

The cost of the Commission's Hydropower Regulation program is completely offset through the collection of annual charges from project licensees in accordance with Section 10(e) of the FPA. As stipulated in its regulations, the Commission assesses annual charges based on licensed operating capacity. The FPA also authorizes the Commission to collect annual charges from a licensee for the use of Federal dams and lands. Beginning in FY 1988, the Commission also began to collect fees from applicants for 5 MW exemptions to cover the cost of processing these types of applications. In addition, in FY 1991, the Commission plans to collect approximately $5 million in headwater benefits payments for deposit to the United States Treasury.

A summary of workload for the three components of the Hydropower Regulation program is provided below. Projected receipts and completions from FY 1989 through FY 1991 are shown in Table 9. Pending workload is shown in Table 10.

Table 9 - Total Hydropower Regulation Workload

	Receipts			Completions		
	FY 1989	FY 1990	FY 1991	FY 1989	FY 1990	FY 1991
Hydropower Licensing	360	422	431	502	461	459
Dam Safety and Inspections	2,217	2,240	2,360	2,217	2,320	2,655
Compliance and Administration	2,408	2,447	2,509	2,275	2,266	2,368
Total	4,985	5,109	5,300	4,994	5,047	5,482

Table 10 - Workload Pending at End of Fiscal Year

	FY 1988	FY 1989	FY 1990	FY 1991
Hydropower Licensing	480	338	299	271
Dam Safety and Inspections	597	597	517	222
Compliance and Administration	482	615	796	937
Total	1,559	1,550	1,612	1,430

Hydropower Licensing

	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request
Operating Expenses	$12,167	$12,062	$15,282

Goals of the Hydropower Licensing Program:

- Ensure that licensed projects are best adapted to the comprehensive development of the Nation's waterways.
- Ensure that environmental concerns are adequately addressed and reconciled before authorizing development of a hydroelectric project.
- Bring electric power generation capacity on-line in shortest possible time.
- Ensure that licensees, potential applicants, and Federal and state agencies are informed of the Commission's relicensing regulations.

Specific Objectives for FY 1991:

- Expedite processing of preliminary permits, exemptions, and new capacity licenses, consistent with a full examination of safety and environmental issues.
- Give high priority to new capacity license applications.
- Act on license applications and major amendments which, if authorized, would result in the construction of approximately 182 MW of new capacity. This renewable resource represents a potential savings of approximately 1.4 million barrels of oil annually.
- Continue the relicensing outreach program, hold additional meetings with licensees, potential applicants, and resource agencies, and assist in providing guidelines for the preparation of complete applications for new licenses.
- Resolve disputes between agencies and potential applicants regarding the types of studies and other procedural requirements related to new license applications.

Program Description

The Commission regulates the development of non-Federal hydroelectric projects that are subject to Congress' Commerce Clause and Property Clause jurisdiction. These projects comprise about half of the Nation's developed hydroelectric power capacity. Overall, hydroelectric projects supply about 9.5 percent of the electric energy generated in the United States.

The Commission has the exclusive jurisdiction (absent a project's possession of a valid pre-1920 permit) to authorize non-Federal hydroelectric projects that:

- are on navigable waters of the United States;
- are on nonnavigable waters over which Congress has Commerce Clause jurisdiction, were constructed after 1935, and affect interstate or foreign commerce;
- are on the public lands or reservations of the United States (excluding national parks and monuments); or
- utilize the surplus water or water power from any Federal dam.

The Commission issues three forms of authorization to U.S. citizens, domestic corporations, states, and municipalities with respect to hydroelectric development: preliminary permits, licenses, and exemptions from licensing. These, along with other major program areas, are discussed below.

Preliminary Permit

A permit, issued for a term of up to 3 years, maintains priority of application (i.e., guaranteed first-to-file status) for license while the permittee studies the site and makes the financial arrangements necessary to apply for a license. A permit does not authorize any project construction. Obtaining a permit is not a prerequisite to applying for, or receiving, a license or exemption for the site.

License

A license is issued for up to a statutory maximum of 50 years, and cannot be unilaterally altered or terminated. Licenses are to be issued for projects that, in the Commission's judgment, will be best adapted to a comprehensive plan for improving or developing a waterway for beneficial public purposes. A licensee pays the Government an annual charge for the Commission's cost of administering Part I of the Federal Power Act (FPA), and additional annual charges for any project use of U.S. lands or reservations, Federal facilities, or water power benefits from upstream Federal projects.

As part of its licensing program, the Commission carries out a number of functions related to the ultimate construction and operation of hydroelectric projects. These licensing functions include: (1) engineering analysis of the design and safety aspects of project structures, to include a prelicense inspection; (2) analysis of economic benefits and financial feasibility of the proposed project; and (3) environmental analysis of project effects.

The majority of hydroelectric licensing matters are disposed of on the basis of a written record by order of the Commission or by order under delegated authority, although some cases may require a hearing before an administrative law judge before a licensing decision is made.

Exemption

The Commission is empowered to exempt from some or all of the licensing requirements of Part I of the FPA certain categories of hydroelectric projects:

- hydroelectric facilities under 15 MW (for nonmunicipalities) and 40 MW (for municipalities) using a manmade conduit operated primarily for nonhydroelectric purposes ("conduit exemptions");

- hydroelectric power projects of 5 MW or less using an existing dam or natural water feature ("5 MW exemptions").

Both types of exemption are subject to the mandatory conditioning authority of the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and comparable state agencies with respect to the mitigation of project impacts on fish and wildlife resources.

An exemption is not deregulation; it is a less comprehensive form of regulation designed for projects with minor potential for adverse environmental impacts. There is no statutory maximum term for exemptions; the Commission issues them in perpetuity. In contrast with a license, an exemption does not confer the Federal power of eminent domain. The Commission has therefore chosen to require an exemption applicant to own the necessary land. Where a project would occupy U.S. lands or reservations, an exemption applicant must obtain a use permit from the appropriate Federal land managing agency.

Environmental Studies

The Commission's staff prepares independent analyses in the form of environmental assessments (EA) and environmental impact statements (EIS) under the provisions of the National Environmental Policy Act (NEPA), when processing applications for license, amendment of license involving new capacity, and exemptions. Staff reviews the applications, obtains additional information, if necessary, issues a public notice of the application, receives comments from agencies and other entities, and then prepares the environmental document. After the application is processed, approximately 1 to 3 months are needed to prepare an EA; an EIS may take 15 to 24 months to complete. The EIS process is more complex than the EA process and generally includes field inspections, public meetings, technical sessions, and scoping documents. The preparation time varies depending on the number and complexity of the issues, the extent of interaction with resource agencies, and the staff resources required.

More than 140 projected completions in FY 1991 will require the preparation of NEPA documents. Of these, a high percentage will require the preparation of an EIS because of the number and complexity of the environmental issues associated with these projects. These EIS's will be completed on individual projects and on groupings of several projects within defined river basin areas. In addition, three EIS's, analyzing multiple projects, will be under preparation and one will be completed, and eight individual EIS's will be under preparation and one will be completed in FY 1991. Staff's effort will be supplemented by contractual support to complete the EIS's in a timely manner.

Staff must analyze the consistency of proposed projects with the comprehensive plans prepared by state or Federal agencies under Section 10(a)(1)(A) of the FPA, as amended by ECPA. More than 370 plans have been filed to date. This effort will involve more staff time in evaluating the plans and considering the potential impacts of the pending projects on the resources discussed in the plans.

Section 10(j) of the FPA, as amended by ECPA, requires the Commission to negotiate with fish and wildlife agencies when agency recommendations for mitigative, protective, and enhancement measures conflict with law. A notice of proposed rulemaking is expected to be issued in FY 1990 to solicit comments from agencies and the general public regarding, among other things, the procedures to be adopted to conduct these negotiations. Because of the increase in controversial issues and the new procedural requirements associated with the construction of hydroelectric projects, the 10(j) requirement will require additional staff resources in FY 1991.

Electric Consumers Protection Act Implementation

Congress passed ECPA on October 16, 1986, effecting significant changes to the FPA. The Commission has undertaken rulemaking efforts to establish procedures and guidance for carrying out specific requirements of the legislation and is now in the final stages of ensuring that the requirements of ECPA are fully integrated into the Hydropower Licensing program.

The Commission issued Order No. 480 (RM87-32-000) on September 30, 1987, implementing Section 14 of ECPA, which required that applicants for initial licenses make a good faith effort to notify certain property owners and government entities of the filing of their applications. On April 28, 1988, the Commission issued Order No. 496 (RM87-7-000), which made final the requirements previously adopted in an interim rule issued March 30, 1987, to implement certain requirements added by ECPA to Section 15(b) of the FPA. These requirements govern the manner and timing of licensee notification of intent to apply for a new license and the information that a licensee must make reasonably available to the public upon notifying the Commission of its intention.

In Order No. 481-A (RM87-36-000), issued on April 27, 1988, the Commission stated its interpretation of state and Federal "comprehensive plans" under Section 3(b)(4) of ECPA and established guidelines for developing such plans. Section 3(b)(4) of ECPA amended Section 10(a) of the FPA to require the Commission to consider, in issuing a hydroelectric license, the extent to which the proposed project is consistent with an existing state or Federal comprehensive plan for "improving, developing, or conserving a waterway or waterways affected by the project."

State governors and Federal planning agencies continue to file plans that they consider comprehensive in accordance with the Commission's definition. Staff continues to review the plans to determine which qualify as comprehensive under Section 10(a)(2)(A), and all plans, whether they are comprehensive or not, are considered by the Commission in making its findings on comprehensive development pursuant to Section 10(a)(1).

Order No. 487 (RM87-6-000), issued December 16, 1987, established procedures for assessing and collecting fees from certain hydroelectric license or exemption applicants to reimburse fish and wildlife agencies for their costs in setting mandatory terms and conditions for those projects. This rule implemented Section 7(c) of ECPA, which added a new Section 30(e) to the FPA, requiring establishment of such fees.

On July 11, 1988, the Commission issued Order No. 499 (RM87-13-000) to implement Section 8 of ECPA, which added a new section 210(j) to the Public Utility Regulatory Policies Act of 1978 (PURPA). Section 210(j) established three new environmental requirements that a hydroelectric project located at a new dam or diversion must satisfy before it can qualify for PURPA benefits. In addition, Section 210(j) imposed a moratorium on the availability of PURPA benefits for such projects to allow Congress time to evaluate whether PURPA benefits should continue to be extended to projects that create new dams or diversions of water. Order No. 499 also terminated an interim rule (RM87-8-000) adopted by the Commission February 13, 1987, concerning certain exceptions from one or more of the new environmental standards imposed by Section 210(j) of PURPA. Order No. 499 adopted the interim regulations as part of the final rule.

The Commission issued Order No. 502 (RM87-24-000) on August 17, 1988, to implement Section 12 of ECPA, which amended the FPA to add a new Section 31. That section provided in part for the assessment by the Commission of civil penalties for violation of or failure to comply with, a rule or regulation issued under Part I of the FPA, any term or condition of a license, permit, or exemption issued under Part I, or a compliance order. The regulations identify those persons subject to penalties and those violations which warrant imposition of penalties and establish procedures for Commission notice of a proposed penalty and for imposition and collection of penalties.

Finally, the Commission issued a final rule (RM87-33-000) on May 17, 1989, revising its regulations governing the relicensing of hydroelectric power projects to implement certain provisions added to the FPA by ECPA. The changes include revised requirements for an application for a new license, a process for prefiling consultation by potential applicants with resource agencies, public involvement in that consultation, new standards and factors for Commission evaluation of relicense applications, and other procedural provisions.

In accordance with the final relicensing rule, staff will continue to make the findings on relicense cases as required by Section 15(a)(2)(A) through (G) of the amended FPA. The new findings require the Commission to consider, in writing, several aspects related to the plans and abilities of the applicant. These findings include: (1) consideration of project safety; (2) the efficiency and reliability of the electric service; (3) the long- and short-term need for power; and, (4) the degree to which the applicant's plans are cost effective. The nature of these determinations requires a significant amount of work by experienced staff members with specialized backgrounds in dam safety, electric system operation, economics, power system planning, and electric power transmission.

Staff is coordinating with state public utility commissions and reviewing applicants' energy conservation programs in order to make findings pursuant to Section 3 of ECPA.

Implementation of Section 10(j) includes the following process: (1) identifying inconsistencies between agency recommendations and Part I of the Federal Power Act or other applicable law; (2) documenting these inconsistencies and clarifying agency positions; (3) assessing the agency positions for potential negotiation; (4) negotiating the positions in an attempt to resolve differences; and (5) assessing the consistency of final positions in relation to the FPA and other applicable laws. The Commission is preparing a notice of proposed rulemaking regarding procedures to be utilized in the negotiation process.

Commission staff is also reviewing each license proceeding to ensure compliance with the antitrust requirements of Section 10(h) of the amended FPA.

All of the above initiatives are of a continuing nature. Significant staff resources were expended on these tasks in FY 1989 and they will continue to be in the future. Any additional rulemakings, such as the 10(j) notice of proposed rulemaking, will have to be implemented expeditiously and effectively, and the implementation process will require the commitment of additional staff.

Relicensing

The Commission has reviewed the upcoming relicensing workload, evaluated its impact on the hydropower program, and is developing an overall management strategy. Between the years 1990 and 2000, over 200 licenses will expire. Of this total, approximately 170 relicense applications (or 85 percent) are expected to be filed early in FY 1992. In FY 1988, the Commission staff began an outreach program where staff held meetings throughout the country to explain Commission rules and procedures to licensees, agencies, and the public. The relicensing outreach program is smoothing the way for the processing of the influx of these relicensing applications.

The Commission issued a final rule on hydroelectric relicensing regulations (RM87-33-000) on May 17, 1989. The staff continues to assist prospective relicense applicants and the Federal, state, and local resource agencies in understanding the new relicensing requirements. Relicensing outreach meetings are continuing and the staff is working closely with resource agencies to ensure that the relicensing regulations are understood and adhered to. This staff effort is focusing on areas where large numbers of licenses are expiring in the next 4 years.

In addition to explaining and interpreting the new relicense regulations, staff will also be involved in resolving any disputes that arise between relicense applicants and agencies prior to the relicense application filing. With approximately 170 relicense applications due to be filed in FY 1992, staff time devoted to this prefiling coordination will increase steadily from FY 1989 into FY 1991.

The largest number of relicense applications will be filed in the first quarter of FY 1992. However, in order to process these applications expeditiously in FY 1992, additional professional staff must be brought on board in FY 1991. These new staff members must have at least six months of exposure to Commission policies and procedures, and experience in processing license applications, before they can be expected to perform effectively in the review and processing of the 1992 relicensing workload. Since many of the expected applications will require extensive environmental work, including environmental impact statements, the initial reviews must be done thoroughly and expeditiously so that the necessary environmental analyses and documents will not be delayed. The FY 1992 relicensing workload is expected to be complex and difficult, and additional trained staff need to be in place in order to handle the large number of filings that will arrive in a short period of time.

Allocation of Niagara Preference Power

The Commission is sometimes called upon to determine allocations of preference power under the Niagara Redevelopment Act, because compliance with the Act is a condition of PASNY's license for the Niagara Project. On July 28, 1989, the Commission issued Opinion No. 329 (MEUA v. PASNY), which determined that the Vermont Department of Public Service (VDPS) and certain municipal distribution agencies (MDAs) do not constitute "public bodies" entitled to an allocation of PASNY preference power under the Niagara Redevelopment Act. The MDA's and VDPS were receiving the preference hydropower from PASNY and reselling it to customers of investor-owned utilities. An appeal from the Commission's order to the District of Columbia Circuit Court of Appeals is now pending.

If the Commission is affirmed, this opinion resolves an issue that has been a major concern of a large number of parties, inculding PASNY, the MDA's, numerous investor-owned utilities, municipalities and cooperatives, and the ratepayers in New York state and seven adjoining states. It also terminates a large number of pending electric rate dockets involving MDA transactions. However, it is likely, based on past history and the value of PASNY preference power, that in the future, other entities, or reconfigured versions of the MDA's and VDPS, will seek to qualify as "public bodies" and prompt further FERC proceedings on this issue.

The Commission may also be presented with questions concerning the allocation of Niagara preference power between preference and non-preference customers when PASNY's contracts with non-preference customers expire in 1990.

FY 1989 Accomplishments - Hydropower Licensing

In addition to the many significant management initiatives implemented by the Commission, the following accomplishments were realized in FY 1989:

- Issued 66 licenses authorizing new capacity, saving the equivalent of 2.6 million barrels of oil annually.

- Issued a comprehensive rulemaking that significantly restructured the Commission's relicensing procedures. This rule implemented the relicensing provisions of the Electric Consumers Protection Act.

- Issued 52 environmental assessments.
- Issued 203 orders on appeal and rehearing regarding hydroelectric issues.
- Conducted meetings with prospective applicants and resource agency personnel in Michigan, New York, Maine, Georgia, Massachusetts, Wisconsin, Minnesota, Pennsylvania, Idaho, Washington, and California to discuss ECPA's requirements and the filing of relicense applications.

Hydropower Licensing Workload

Three major workload areas constitute the highest priority in the Hydropower Licensing program -- new capacity licenses, new capacity amendments to licenses, and relicenses.

The number of applications for license for new capacity projects and new capacity amendments to licenses peaked in FY 1985. Since that time, receipts in these workload categories have declined significantly, especially following the expiration of energy tax credits at the end of calendar year 1985. A total of 53 new capacity license applications are expected to be filed in FY 1990 and in FY 1991.

Pending workload in new capacity applications is decreasing. Much of this decrease is attributable to a decline in filings relative to past years and to staff efforts to complete the processing of new capacity cases. Many of the remaining cases, however, still involve complex engineering and environmental issues that demand extensive staff analyses. These complex new capacity applications also require preparation of comprehensive environmental documents that consider all aspects of the impacts associated with approval of an application. In FY 1991 pending workload for new capacity projects will be 97, or 40 percent less than FY 1989. In order to achieve this pending number, a total of 85 new capacity completions will take place in FY 1990 and 87 will occur in FY 1991.

Workload for preliminary permits and exemptions from licensing will remain about constant between FY 1989 and FY 1990. Completions should generally keep pace with expected receipts. Overall, pending workload in permits will remain relatively steady during this period. For exemptions, only 18 applications will be pending by the close of FY 1991.

The decline in overall pending numbers will be offset to some extent by the need for more indepth environmental, engineering, and economic reviews required by ECPA's provisions. The amount of staff effort necessary to process the licensing workload has increased dramatically during FY 1989, and this trend should continue through FY 1991. Among the reasons for this increase in effort are:

- The procedural issues raised in Sections 4(e), 18, and 10(j) of the Federal Power Act have introduced complexities into case processing not previously encountered. These issues require extensive interaction with Federal and state resource agencies before staff recommendations can be completed and before licensing decisions can be made.

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- Many pending and anticipated applications require the preparation of environmental impact statements, which extends the processing time for each case affected by a minimum of one year. In addition, even with contractual support, there are responsibilities for staff review and oversight.

- The proposed 10(j) rule, continuation of the outreach initiatives, and the need to do the technical analysis associated with the OHL Director's dispute resolution responsibilities during prefiling consultation do not contribute to the completion of cases in the short term, but are necessary to ensure that future application processing proceeds smoothly.

The Commission will be utilizing private contractor support to assist with the preparation of environmental documents. In FY 1991, $4 million is being requested in order to complete, via contract, environmental analyses and documents. It is imperative that these environmental reviews not be delayed, so that processing of complicated pending projects can be completed before the large number of relicense filings due in early FY 1992 arrives.

The overall workload of the Hydropower Licensing program is shown below.

Table 11 - Hydropower Licensing Workload

	Receipts			Completions		
	FY 1989	FY 1990	FY 1991	FY 1989	FY 1990	FY 1991
Major Hydroelectric Licenses:						
Constructed	2	10	10	4	5	7
New Capacity (Formal)	0	2	2	0	1	1
New Capacity (Nonformal)	16	16	16	70	44	42
Relicense (Formal)	0	1	1	0	1	1
Relicense (Nonformal)	6	1	11	7	10	11
Minor Hydroelectric Licenses:						
Constructed	7	20	20	0	4	12
New Capacity	19	25	25	37	32	34
Relicense	10	1	0	13	5	1
Surrender of License	46	40	40	53	45	40
Transfer of License	61	70	70	82	75	75
Amendment (New Capacity)	10	10	10	9	8	10
Preliminary Permit	116	145	145	150	150	150
Transmission Line License	0	1	1	0	1	0
Exemptions from Licensing (5 MW or less)	12	15	15	19	15	15
Exemptions: Conduit	13	15	15	13	15	10
Surrender of Preliminary Permits	42	50	50	45	50	50
Total	360	422	431	502	461	459

Table 12 - Workload Pending at End of Fiscal Year

	FY 1988	FY 1989	FY 1990	FY 1991
Major Hydroelectric Licenses:				
Constructed	11	9	14	17
New Capacity (Formal)	0	0	1	2
New Capacity (Nonformal)	160	106	78	52
Relicense (Formal)	1	1	1	1
Relicense (Nonformal)	35	34	25	25
Minor Hydroelectric Licenses:				
Constructed	2	9	25	33
New Capacity	64	46	39	30
Relicense	8	5	1	0
Surrender of License	20	13	8	8
Transfer of License	41	20	15	10
Amendment (New Capacity)	10	11	13	13
Preliminary Permit	99	65	60	55
Transmission Line License	0	0	0	1
Exemptions from Licensing (5 MW or less)	14	7	7	7
Exemptions: Conduit	6	6	6	11
Surrender of Preliminary Permits	9	6	6	6
Total	480	338	299	271

Dam Safety and Inspections

	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request
Operating Expenses	$10,015	$11,299	$12,583

Goals of the Dam Safety and Inspection Program:

- Ensure that licensed and exempted projects are inspected in the construction, operation, and maintenance phases for the protection of life, health, property, and the environment.
- Ensure compliance with the terms and conditions related to dam safety in each license and exemption.
- Provide assistance to Division of Project Compliance and Administration during project inspections to ensure compliance with non-dam safety requirements.

Specific Objectives for FY 1991:

- Conduct more than 2,000 planned operation, construction, prelicense, exemption, compliance, and special inspections.
- Ensure the overall supervision of projects for compliance with the terms and conditions related to dam safety in each license and exemption and applicable regulations.
- Require the performance of full-scale emergency action plan tests at 12 major, multi-development projects. These tests would involve state and local agencies to develop better Federal, state, and local cooperation and to verify the overall effectiveness of emergency action plans should there be an actual emergency.
- Publish additional chapters for the Engineering Guidelines dealing with emergency action planning and buttress dams.
- Conduct full scale evaluations of more than 200 major projects to assess the structural integrity, maintenance, and instrumentation of major dam structures.
- Implement a review of dam safety instrumentation of major dam structures to ensure that all such dams are properly monitored.

The Commission is responsible for the inspection of about 2,100 dams, an increase of 1,200 from 1977. The Dam Safety and Inspection program ensures that licensed and exempted projects are constructed, operated, and maintained in accordance with approved plans, sound engineering practices, and the terms and conditions of licenses or exemptions. Over two-thirds of these dams are

more than 50 years old. As dams age, it is extremely important to be more vigilant of dam safety. To ensure that the structural integrity of any dam is maintained, a periodic inspection program is important in identifying necessary maintenance and remedial modifications. It is equally critical that projects be inspected during construction to ensure that the project, as actually built, is consistent with the design.

Historically, failures of dams most likely occur: (1) during the early years of operation due to faulty construction, inadequate design, or foundation problems that were not properly identified; or (2) when a dam has been in operation for many years and there has been inadequate maintenance and evaluation of the dam. The Commission's Dam Safety and Inspection program and the workload associated therewith are directed to these critical factors. Descriptions of the various types of workload associated with the program are shown below.

Construction Inspections

Major projects are normally inspected once a month; however, inspections are more frequent when unusual problems are encountered and less frequent during periods of work interruption, winter slowdown, or when construction activity indicates that less frequent inspections are needed. The issuance of a license for an unconstructed major new capacity project has a much greater impact on inspection workload than the issuance of a license for a constructed project due to the frequency of inspections.

In conducting these inspections, the inspecting engineer ensures that all provisions of the license are being complied with, that any safety hazards or noncompliance concerns are reported, and that any nonconformance to license exhibits or contract plans and specifications is identified. The inspecting engineer also verifies adherence to sound construction and quality control practices and ensures that appropriate documentation records are being maintained. At various stages during construction, the inspector focuses on and makes appropriate assessments of:

- excavation for tunnels, structures and roadways;
- foundation conditions and preparation;
- type and placement of embankment, concrete and other materials;
- installation of machinery and equipment;
- reservoir clearing; and
- installation and construction of recreation, fish, and wildlife facilities.

The inspecting engineers carefully observe and describe in their inspection reports the quality of the materials used and work performed. In particular, any significant deficiencies are reported in writing to the licensee for

remedial action, especially any unsafe practices and noncompliance with license conditions. The Commission proposes to complete 610 construction inspections in FY 1991, 21 percent more than the number estimated for FY 1990 and 68 percent more than were completed in FY 1989.

Operation Inspections

Once project construction is completed, the Commission ensures the safe operation and proper maintenance of a project. Inspecting engineers conduct periodic operation inspections to ensure that the project is properly operated and maintained. These inspections are the basis of a dam safety program that involves: (1) evaluation of the structural integrity of dams by requiring that owners retain an approved consultant every 5 years to conduct an independent inspection and prepare a report of the inspection in accordance with Commission regulations; (2) requiring emergency action plans (EAP) for all major dams to provide an early warning to upstream and downstream inhabitants in the event of a sudden release of water resulting from an accident to or failure of a dam (the purpose of an EAP is to ensure the safety of the public should there be any unanticipated safety problem, even if the dam is considered safe with the application of the best available analytical and technical methods); and, (3) requiring remedial measures (modifications) or maintenance to ensure the long-term structural integrity of dams under the Commission's jurisdiction.

An important part of the inspecting engineer's duties when conducting an operation inspection is to ensure that EAP's are properly maintained and can be readily implemented if an emergency occurs. The plans provide local authorities with emergency measures crucial to the orderly evacuation of all residents located in the immediate areas. EAP's are reviewed annually by staff and periodic tests are conducted by the dam owners to ensure adequacy. Currently, there are 972 EAP's in effect for major dams that are reviewed on an annual basis.

The frequency of project inspections is determined by a project's potential hazard classification. High-hazard and significant-hazard projects are inspected annually while low-hazard projects are inspected triennially or biennially depending on their size. Commission inspecting engineers examine the project for any appreciable water seepage, deterioration of the structures, and unusual overflow conditions and major damages to the project works resulting from floods. In addition, inspectors check other project features such as spillway gates, penstocks, pipelines, canals, and generating equipment to verify that the project is being operated and maintained in a manner that will ensure the efficient use of water resources.

During the course of these inspections, important safety matters are immediately brought to the attention of the licensee by the inspecting engineer in order to expedite required corrective measures. All findings and observations are documented in an operations inspection report. In FY 1991, an estimated 990 inspections of operating facilities will be completed, 13 percent more than were completed in FY 1989.

Public Safety

Reservoirs at FERC-licensed projects attract large numbers of people seeking recreational experiences. An important aspect of the inspection of all projects is an assessment of the need for devices to warn and protect the public at areas that could be dangerous, particularly near powerhouses and power lines, near spillways or gated structures such as intakes, and in rivers downstream of project dams. Prior to the Commission's promulgation of regulations in this regard in 1981, there were a significant number of accidents reported. Since 1981, the number of accidents has dramatically decreased, even though there has been a three-fold increase in the number of projects. The popularity of water sports at hydropower projects requires continued vigilance with regard to this aspect of the program. The benefits of this effort, measured in lives saved and accidents prevented, have far outweighed its costs.

Exemption Inspections

After an application for exemption from licensing is initially filed, an inspection is made to verify if additional dam safety and environmental provisions are needed in a case-specific exemption order. In addition, these inspections verify the exemption status of a project. Follow-up inspections are made at these projects as the need arises. For more important projects, the inspection frequency could be the same as a licensed project. The first inspection conducted is to verify the start of and observe construction. Subsequent inspections are to observe the completed project and its operation. Additional inspections can be made during construction to ensure compliance with the exemption order if necessary. A significant number of exempted projects are inspected on an annual basis for dam safety reasons. Due to growing concerns by other Federal and state agencies, more frequent inspections are conducted to ensure compliance with environmental conditions imposed by such agencies. The Commission estimates that 340 exemption inspections will be completed in FY 1991, a 17 percent increase over FY 1990.

Prelicense Inspections

A prelicense inspection is made at all projects with a constructed dam while the license application is pending, in order to verify that the application conforms with existing regulations and that the exhibits filed with the application accurately describe the existing facilities. Constructed projects are inspected biennially after the initial inspection while the application is pending. The inspection also provides information on any dam safety problems that may not be apparent in the application and establishes a hazard potential category for the structure that will be considered in licensing the project. In addition, similar inspections are made for operating projects where the Commission is determining whether or not it has jurisdiction (see discussion on unlicensed projects). An inspection report is completed which includes comments on plans for redevelopment, increases in capacity, and recreation use. In FY 1991, 80 prelicense inspections will be completed, an increase of 33 percent over the inspections projected in FY 1990.

Unlicensed Projects

The Commission is responsible for ensuring that unlicensed operating projects are licensed if found to be jurisdictional under the Federal Power Act. Licensing such projects imposes Commission regulation over two important factors -- first, and most importantly, the condition of the projects and the safety of the dams and, second, the impact of the projects on the environment. The Commission is continuing its efforts to determine whether operating projects are jurisdictional, with priority given to those projects which pose the greatest safety hazard. If jurisdiction is found, the Commission will order the owner to submit an application for license to ensure safe operation and maintenance of the project, and to implement appropriate terms and conditions to protect and enhance the environment. This workload will require inspections to identify any safety or environmental concerns that may exist and compliance actions to correct any problems encountered. Of the 80 prelicense inspections that will be conducted in FY 1991, about one-half will involve unlicensed operating projects.

Special Inspections

Special inspections are made whenever an emergency or unusual situation such as a complaint occurs. Emergencies include earthquakes, land or rock slides, floods, sudden changes in the condition of dams such as the appearance of cracks or other problems including signs of other forms of deterioration, significant changes in instrumentation readings, or even a significant change in a seepage condition. The purpose of these inspections is to determine the presence of any dam safety problems, to establish the hazard potential of the dam, and to address an emergency situation that requires immediate measures to ensure the safety of downstream life and property. This could include emergency repairs, changes in operation, or a significant reduction in the reservoir operating level.

Consultant Inspection Reports

The Commission's regulations require that all major licensed or exempted dams be inspected at 5-year intervals by an approved, independent consultant to supplement the Commission's inspections and assist in identifying deficiencies that might endanger the public. The consultant's inspection report delineates any current or potential deficiencies in the condition of project structures, quality and adequacy of maintenance, methods of operation, and ability to pass floods. The dam safety inspection staff reviews the reports for adequacy and possible follow-up action associated with the consultant's recommendations. The workload associated with this activity fluctuates from year to year because the report due dates are related to the issuance dates of licenses. However, with the more than three-fold increase in the number of licensed and exempted projects in the last 10 years, this workload has increased significantly. In FY 1989, staff completed the review of 152 reports. In FY 1991, the number of reports reviewed will increase to 160.

Dam Safety Engineering Evaluation and Support (DSEES)

In each phase of project licensing, construction and operation, there are critical aspects of the Commission's dam safety program that require engineering reviews and evaluation. An effective program that has as its objectives the protection of the millions of people and their property that are located downstream of major dams in this country must give close attention to each aspect involving the construction, operation, and maintenance of a dam and its appurtenant facilities.

During the construction stage, dam safety functions primarily include: (1) detailed review and approval of those portions of plans and specifications that could affect the safety of a dam; (2) review and approval of the dam developer's quality control and inspection programs to ensure that quality construction takes place that meets the dam designer's intent; (3) review of the results of engineering and geologic investigations to assess the adequacy of the dam site; (4) approval of licensees' engineering consultants to ensure that they are qualified and to ensure that there are no conflicts of interest; and (5) detailed engineering review of the final design of the dam before construction begins.

As discussed previously, projects are inspected during construction. Relative to construction, it is important that dams have monitoring instruments to assess performance. Instrumentation plans must be reviewed in detail and approved, often with significant changes to assure the maximum ability to monitor all important components of a structure. For existing dams, instrumentation is continually assessed to improve monitoring capabilities and to make state-of-the-art improvements.

Once the construction of a dam is complete, the reservoir should be filled using a carefully thought-out reservoir filling plan. Such plans are required on all new major dams, since the potential for failure of a dam is greatest while a reservoir is being filled.

In addition, the dam safety and inspection program includes other significant activities that are necessary to a well-rounded program. These include, among others: (1) providing engineering support to the project licensing staff in areas requiring special expertise, such as structural engineering, hydroTogy, seismic evaluation, and engineering geology; (2) reviewing and acting upon requests submitted by project owners that their projects be exempted from the Commission's regulations pertaining to independent consultant inspections and the preparation of emergency action plans; and (3) providing expert engineering witnesses to support the Office of the General Counsel or the Commission in testimony in formal proceedings.

Other important activities include: (1) promulgation of Engineering Guidelines; (2) participation in dam safety research and the development of training aids for dam safety inspections; and (3) coordination with other Federal and state agencies to improve dam safety nationwide.

Finally, if an emergency occurs at any dam, an emergency team of engineers is automatically formed under predetermined operation procedures to conduct necessary inspections and evaluations, and to implement emergency repairs or operational changes to ensure maximum protection of the public.

The workload for these activities is significant. In FY 1989, there were 259 reviews and approvals and other workload of this type, with 215 projected for FY 1991.

Relicensing

Between now and 1993, the Commission will experience a dramatic increase in its relicensing workload. With respect to dam safety, the staff will continue its review and evaluation of the safety of all dams subject to relicense. The goal is to ensure that dam safety has been adequately addressed under the Commission's regulations and the current license so that dam safety will not be an issue during relicensing.

FY 1989 Accomplishments - Dam Safety and Inspections

- Worked with state agencies to promote dam safety and license compliance activities.
- Maintained conformance with the President's Guidelines for Dam Safety.
- Reviewed the status of emergency action plans for projects on a semiannual basis to ensure that adequate plans had been established and maintained to protect the public in the event of an emergency.
- Maintained a highly trained professional staff of engineering specialists.
- Performed 1,806 dam safety inspections and produced written inspection reports for each inspection.
- Improved the productivity of engineering staff through the increased use of computers in technical analysis and administrative functions.
- Inspected all dams with high- and significant-hazard potentials.
- Identified over 100 dams that did not meet current engineering criteria and required the licensees to initiate remedial measures to correct the deficiencies.
- Updated the Staff Operating Manual for Inspection of Projects and Supervision of Licenses, Permits and Exemptions, an internal procedural document to provide regional office personnel with current guidelines to be used in the administration of projects.

- Revised engineering criteria for the evaluation of concrete gravity dams which is estimated to save industry about $87 million over the next 3 years.

- Instituted a special evaluation of all buttress dams because of their special structural problems resulting from original design flaws and concrete deterioration.

Dam Safety and Inspections Workload

The trend of an increasing workload with respect to dam safety and related inspections is expected to continue for the foreseeable future. Since 1977, the number of dams under the Commission's jurisdiction has more than doubled. Concurrently, the number of inspections and compliance requirements has increased four-fold during the same time period. The Commission has implemented numerous procedures to effectively and efficiently handle this unprecedented workload increase. In addition to the increasing workload from new projects, the Commission will begin activities related to relicensing of nearly 200 projects between now and 1993.

During FY 1989, procedures were improved to provide better coordination between Commission components with respect to compliance activities. The Commission's staff in the five regional offices supports both the inspections and compliance functions. The revised procedures also have streamlined coordination and have led to the identification of more non-compliance and follow-up corrective actions. This has enabled inspectors to concentrate on dam safety work, thus strengthening the overall dam safety capabilities of the inspections program.

Table 13 shows the workload for the dam safety and inspection program. In FY 1989, 1,806 dam safety inspections were performed and estimated inspections are 1,985 in FY 1990 and 2,280 in FY 1991. The inspection process has become more time-consuming because of the increasing number and complexity of the conditions contained in recently issued licenses and the need to allocate more effort to compliance activities. However, due to increased productivity, staff has been able to provide more indepth inspections and reports without increasing the time allocated to each inspection. This productivity increase resulted from improving procedures and instructions to staff, and providing increased support through computers, electronic mail, and other advanced technologies. Table 14 shows pending workload for the dam safety and inspection program for FY 1988 through FY 1991.

Table 13 - Dam Safety and Inspections Workload

	Receipts			Completions		
	FY 1989	FY 1990	FY 1991	FY 1989	FY 1990	FY 1991
Operation Insp.	878	895	925	878	930	990
Prelicense Insp.	40	60	80	40	60	80
Construction Insp.	363	480	530	363	505	610
Exemption Insp.	283	275	275	283	290	340
Special Insp.	242	200	210	242	200	260
DSEES	259	190	200	259	190	215
Part 12 Reviews	152	140	140	152	145	160
Total	2,217	2,240	2,360	2,217	2,320	2,655

Table 14 - Pending Dam Safety and Inspections Workload

	FY 1988	FY 1989	FY 1990	FY 1991
Operation Insp.	138	138	103	38
Prelicense Insp.	0	0	0	0
Construction Insp.	175	175	150	70
Exemption Insp.	100	100	85	20
Special Insp.	125	125	125	75
DSEES	20	20	20	5
Part 12 Reviews	39	39	34	14
Total	597	597	517	222

Project Compliance and Administration

	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request
Operating Expenses	$ 3,868	$ 7,265	$ 7,930

Goals of the Project Compliance and Administration Program:

- Ensure compliance with the terms and conditions in each license, exemption, and preliminary permit.
- Ensure timely action on amendments of license and exemption.
- Effectively administer the power site lands program.
- Identify and bring under license those operating unlicensed projects that are determined to be within the Commission's jurisdiction.
- Effectively administer the headwater benefits program for the Commission.

Specific Objectives for FY 1991:

- Investigate and bring into compliance approximately 500 violations of hydropower license and exemption requirements.
- Streamline the procedures for processing amendments of license and exemption.
- Standardize procedures for power site lands actions.
- Accomplish 35 jurisdictional determinations of unlicensed operating hydropower projects and, for those found to be jurisdictional, take appropriate action requiring the project owners to file a license application.
- Initiate 2 headwater benefits studies and issue approximately 32 annual bills.
- Evaluate the Hydropower Licensing Compliance Tracking System to improve its usefulness and reliability as a compliance monitoring tool and its applicability as a database for tracking a project's compliance history.
- Assist in developing and implementing the Commission's civil penalty policy and procedures.
- Develop policy and procedures to implement the Project Safety Program.

Program Description

The Commission is responsible for monitoring and investigating compliance with: (1) the Commission's rules, regulations, and statutes; and (2) the terms and conditions of each of the more than 2,200 outstanding hydropower licenses, exemptions, and preliminary permits. The Commission's compliance program ensures that projects are constructed, operated, and maintained in adherence to the power and development purposes for which they were issued and for the preservation of environmental quality.

The substantial increase in licensed and exempted projects in recent years require the Commission staff to devote substantially more effort to the compliance workload. The Division of Project Compliance and Administration, created in February 1988, centralized compliance monitoring and increased managerial oversight of compliance activities.

Compliance

Hydropower developers may violate license and exemption requirements in two ways--failing to file a document in the prescribed timeframe, and failing to meet substantive tenets of the license or exemption articles prescribing certain structural, operational, or mitigative requirements.

Virtually every license and exemption order requires the filing of post issuance documents with the Commission. Every filing requirement of a Commission license or exemption is documented in the computer-based Hydropower License Compliance Tracking System (HLCTS). Any required filing not made with FERC is identified by HLCTS through a weekly printout of overdue items. Currently HLCTS monitors more than 10,000 filing requirements contained in the Commission's regulations and in orders issued by the Commission. Failure to file any one of these items on time initiates a compliance action.

All licenses and exemptions prescribe how the authorized hydropower project is to be constructed and operated based on approved plans and specifications. All issued licenses and exemptions contain measures designed to mitigate for environmental and engineering concerns (i.e., minimum flows, wildlife habitat enhancement, archeological preservation, structural integrity). Instances of noncompliance, where specific terms, measures, specifications, and/or limits are not being met or adhered to, are identified during the course of inspections by the regional office staff, or communicated to FERC by resource agencies and other entities. The staff establishes contacts with resource agencies and other interested groups to encourage easy reporting of instances of noncompliance. Failure of the licensee or exemptee to construct the project as specified, to operate the project within the constraints of the authorization, or to provide a mitigative measure results in the initiation of a compliance action.

The majority of the terms and conditions contained in licenses and exemptions are complied with satisfactorily and according to schedule. In instances requiring compliance actions, however, the staff initiates an investigation and issues a notice of violation. Where licensees and exemptees are not diligent in fulfilling their responsibilities, a compliance order pursuant to Section 31(a) of the FPA, a directive to cease project construction or operation, or a court injunction or other remedies may be necessary to bring the violators into compliance. Violations requiring legal remedies are referred to the Commission's Office of the General Counsel.

In addition to monitoring compliance with licenses and exemptions, the Commission ensures compliance with preliminary permits. Permittees are required to conduct certain environmental and other studies in consultation with resource agencies and to file 6-month status reports that demonstrate the progress made toward the decision on project feasibility. The Commission believes it is critical that appropriate studies be conducted during the permit period so that resource agencies have adequate information to make decisions on the appropriate recommendations for the protection of their respective resources. Also, any application for license must provide sufficient information upon which sound decisions can be made on whether a project should, or should not, be developed. In FY 1989, a total of 65 preliminary permits were cancelled for noncompliance with permit requirements. The Commission expects that 60 preliminary permits will be cancelled in FY 1990, and 60 in FY 1991.

Staff also maintains a record of a licensee's compliance with the terms and conditions of its license. This record is maintained for purposes of future review under Section 15 of the FPA when the Commission determines if a new license should be granted to the existing licensee. Since this new compliance program was established in FY 1989, a growing number of noncompliance allegations have been recorded. Over 500 new receipts in FY 1991 will be added to 333 pending cases. The workload in this area was initially underestimated when compliance activities were centralized in 1988. Some staff will be reassigned to compliance activities in FY 1990 but additional staff will still be needed to handle the increase in workload. Also, more travel will be required to inspect and investigate the most serious noncompliance allegations. Contracts could be used to perform specialized inspections to help process the workload.

Compliance Inspections

To monitor compliance and ensure that the number of occurrences of noncompliance are minimized, inspectors from the five regional offices conduct regular inspections to identify any violations of license and exemption requirements. Staff responsible for compliance also conduct project inspections as part of on-going investigations of alleged instances of noncompliance. Current policy emphasizes the importance of coordinating compliance inspections with environmental resource agencies, including the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and the various state resource agencies. The regional offices maintain regular contact with licensees, exemptees, and the representatives of Federal and state agencies and environmental organizations in order to enhance communication and to monitor compliance more effectively. In FY 1989, 178 compliance inspections were conducted. In FY 1990 and FY 1991, 205 compliance inspections are scheduled each year.

Civil Penalties

In situations where a civil penalty may be appropriate, a proposed penalty is based on various factors, including the severity of the noncompliance item, the licensee's knowledge of the violation and its willingness to quickly remedy the noncompliance matter. The Commission issued a final rule in FY 1989 establishing procedures for assessing civil penalties. Commission actions during FY 1989 and FY 1990 will establish precedent regarding the appropriate amount for civil penalties and when civil penalties are warranted. The procedures for processing of compliance actions are evolving as the number and types of violations discovered and the number of actions taken increases.

In FY 1989, the Commission issued several notices of proposed penalties and approved other settlement agreements. The Commission projects a workload of 60 civil penalty cases in FY 1990 and 120 cases in FY 1991. The increase in workload is attributed to the high number of violations meriting penalty consideration. Civil penalty precedent and procedures established and defined during FY 1989 and FY 1990 will facilitate the processing of these cases. Additional staff will be required to handle the new workload associated with assessing penalties and satisfying the hearing requirements of section 31 of the FPA.

Amendments

It often becomes necessary for a licensee or exemptee to modify some aspect of its project, such as a change to existing project works or operation, a revision of project boundaries, a change in authorized capacity, or a modification of the terms and conditions of its license or exemption. These changes are accommodated by amending existing licenses and exemptions. This workload has increased steadily since the issuance of record numbers of licenses and exemptions between 1984 and 1987 and will continue to increase as licensed and exempted projects are constructed and begin operation. In FY 1990 and FY 1991, receipts will exceed 1,000.

Unlicensed Constructed Projects

There are a large number of constructed hydropower projects that have been identified as operating and potentially required to be licensed by Section 23(b) of the FPA. Therefore, there may be public safety and environmental concerns that either have not been addressed or have not been properly addressed by project owners as required under the applicable provisions of the FPA.

Because of these potential effects and the need to ensure compliance with the FPA, the Commission will continue to investigate operating unlicensed projects in FY 1991. These projects are identified by the staff through record searches and through information provided by other Federal and state agencies and individuals. Each project requires investigation and research to allow the Commission to make a jurisdictional determination.

As part of these investigations, site inspections are conducted at each project. Research is done on project characteristics and their relation to the jurisdictional bases of the Commission's licensing program. Some of the historical research associated with these investigations will continue to be accomplished through contractors. This effort enables the Commission staff to be approximately twice as productive in making jurisdictional determinations as it would be without this support. Concurrent with the Commission issuance of an order finding that licensing is required, owners of such projects are ordered to file license applications within a reasonable period of time and to comply with the FPA and the Commission's regulations.

Headwater Benefits Determinations

The Commission is required to determine and fix annual charges for headwater benefits, based on the advantages received from upstream Federal project storage or other licensed projects. In accordance with Section 10(f) of the FPA, the Commission conducts studies to determine the equitable amount that an owner of a downstream, nonfederal hydropower development shall pay to the United States, or to a licensee, for benefits provided by a federally-owned or licensed headwater improvement. The downstream beneficiaries are required to reimburse the Commission for the cost of conducting these studies. In FY 1988, more than $11 million in charges were levied. In FY 1991, the Commission expects to initiate 2 new headwater benefit studies, and issue an estimated 32 annual bills. The Commission has returned more than $110 million to the U.S. Treasury under this program since 1920; $75 million of this amount has been collected since 1978.

Contract funds are being requested to perform analyses to determine additional charges, and to allow the staff to determine the annual assessments of these charges.

Power Site Lands

The Commission: (1) processes applications for the restoration of power site lands to location, entry, or selection under the public land laws subject to the provisions of Section 24 of the FPA; (2) comments on Bureau of Land Management proposals to revoke power site reserves, water power designations, and power site classifications; (3) comments on applications filed with the Bureau of Land Management for non-waterpower permits, leases, and rights-of-way involving power site lands; and (4) reports to the Bureau of Land Management on the licensing status of power site lands that are being considered for entry in accordance with the Mining Claims Rights Restoration Act of 1955. It is estimated that 450 power site lands cases will be completed by the Commission in FY 1991.

Project Safety

The Project Safety Program identifies and evaluates non-dam hazard conditions at project sites and implements the steps required to reduce or eliminate such hazards. Commission orders and regulations require public access at licensed projects for recreational purposes and permit public access to project lands for a variety of uses unrelated to the project.

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Commission responsibilities include enforcing compliance with license terms and conditions. The Commission also promotes participation in accident prevention programs and encourages safe use of project lands and waters. A specific Commission objective for FY 1991 is to develop policies and procedures to adequately implement the Project Safety Program.

FY 1989 Accomplishments - Project Compliance and Administration

FY 1989 accomplishments of the new compliance program were as follows:

- Issued 32 annual headwater benefits bills totalling more than $5,500,000.
- Issued directives to staff regarding major policy statements on compliance activities.
- Implemented the Commission's final rule on civil penalties.
- Issued approximately 30 compliance orders under the civil penalty provisions.
- Completed over 400 license, exemption, and permit compliance actions and over 1,000 amendment actions.
- Made jurisdictional determinations on 38 projects and required the owners of the projects found to require licensing to immediately start the preparation of license applications.
- Accomplished 412 power site lands actions.

Tables 15 and 16, below, summarize the workload in the Project Compliance and Administration program.

Table 15 - Project Compliance and Administration Workload

	Receipts			Completions		
	FY 1989	FY 1990	FY 1991	FY 1989	FY 1990	FY 1991
Environmental Amendments	492	450	450	476	425	425
Engineering Amendments	170	200	200	202	190	190
Schedule Amendments	301	275	275	310	275	275
Project Amendments	73	90	90	74	80	80
Non-Project Use of Project Lands	66	60	60	45	50	50
Cancellation of Preliminary Permits	63	60	60	65	60	60
Declaration of Intention	11	10	10	14	10	10
Unlicensed Projects	34	35	35	38	35	35
Federal Lands Review	424	450	450	412	450	450
Headwater Benefits Inves.	0	0	2	1	1	1
Headwater Benefits Assessments	32	32	32	32	32	32
Environmental Compliance	257	250	250	171	200	225
Engineering Compliance	44	40	40	35	35	40
Procedural Compliance	24	30	30	28	25	30
Schedule Compliance	236	200	200	194	175	200
Penalty Assessment	3	60	120	0	18	60
Compliance Inspections	178	205	205	178	205	205
Total	2,408	2,447	2,509	2,275	2,266	2,368

Table 16 - Workload Pending at End of Fiscal Year

	FY 1988	FY 1989	FY 1990	FY 1991
Environmental Amendments	174	190	215	240
Engineering Amendments	67	35	45	55
Schedule Amendments	51	42	42	42
Project Amendments	23	22	32	42
Non-Project Use of Project Lands	21	42	52	62
Cancellation of Preliminary Permits	10	8	8	8
Declaration of Intention	10	7	7	7
Unlicensed Projects	4	0	0	0
Federal Lands Review	4	16	16	16
Headwater Benefits Investigations	3	2	1	2
Headwater Benefits Assessments	0	0	0	0
Environmental Compliance	83	169	219	244
Engineering Compliance	10	19	24	24
Procedural Compliance	11	7	12	12
Schedule Compliance	11	53	78	78
Penalty Assessment	0	3	45	105
Compliance Inspections	0	0	0	0
Total	482	615	796	937

Federal Energy Regulatory Commission
FY 1991 Congressional Budget Request

OIL PIPELINE REGULATION

Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request
Oil Pipeline Regulation - Operating Expenses	$2,615	$3,390	$3,206
FTE's	39	48	45

Authorization:

Oil Pipeline Regulation: Interstate Commerce Act; Department of Energy Organization Act; Regulatory Flexibility Act; Outer Continental Shelf Lands Act; and Crude Oil Windfall Profit Tax Act.

Goals of the Oil Pipeline Regulation Program:

- Ensure that shippers and consumers are not adversely affected by unjustifiably high tariffs.
- Ensure that shippers are provided transportation service which is not unduly discriminatory, preferential, or at unjust or unreasonable rates.

Specific Objectives for FY 1991:

- Review and decide all initial and other tariff filings within the 10-day and 30-day notice periods.
- Decide oil pipeline formal rate cases that either implement the criteria set forth in Opinions No. 154-B and 154-C, or in the alternative, adopt a lighter handed approach to ratemaking where sufficient competition is shown to exist.
- Implement the Commission's program on oil pipeline rate design as quickly as possible.
- Establish precedent to achieve oil pipeline competition and light-handed regulation of oil pipelines.

The Commission's responsibilities in the Oil Pipeline Regulation program cover approximately 130 common carrier oil pipelines. The United States is the world's largest consumer and the third largest producer of crude oil. Enormous requirements for crude oil and for transportation of the oil through various pipeline delivery systems continues. The Commission's responsibility for the transportation of crude oil and petroleum products includes: (1) establishing transportation rules and rates that are fair to shippers and consumers; and (2) encouraging the prudent expansion of oil pipeline facilities to accommodate changing receipt and delivery patterns.

Functions and Legislative Requirements

The Department of Energy Organization Act of 1977 transferred the determination of oil pipeline rates from the Interstate Commerce Commission to the FERC. The current Oil Pipeline Regulation program performs three primary functions: (1) tariff rates, (2) depreciation reviews, and (3) financial audits.

Tariff Rates

The Interstate Commerce Act (ICA) requires that oil pipelines which transport crude oil or petroleum products in interstate commerce file tariff and rate changes with the Commission. The statute requires that these filings be noticed for 30 days. The Commission's regulations also permit tariff filings for new facilities on 10-days notice, and allows other notice periods if good cause is shown. The program staff reviews each oil pipeline rate tariff filing for compliance with the Commission's regulations and ratemaking methodology. The Oil Pipeline Board either accepts, rejects, or suspends tariff filings if it finds them to be not just and reasonable and not in compliance with Opinion No. 154-B. Section 15(7) of the ICA requires that filings which the Board suspends must be set for formal investigation. This, in turn, triggers formal proceedings. At the conclusion of the proceedings, the Commission issues its order.

In June 1985, in response to a D.C. Circuit Court remand of Opinion No. 154 in the Williams Pipeline Company rate proceedings, the Commission issued Opinion No. 154-B. This opinion established a trended original cost methodology as the appropriate rate base for the oil pipeline industry. Application of this methodology would be based on a starting rate base for each individual carrier in service prior to the Opinion. Rate of return would be determined on a company specific basis and the equity portion of the rate of return would be a "real," as opposed to a "nominal," rate of return. This "real" equity rate of return would be determined on the basis of the risks faced by the pipeline company. In Opinion No. 154-C, issued in December 1985, the Commission, with minor modification to the treatment of income taxes, reaffirmed Opinion No. 154-B.

A recent judicial decision has forced the Commission to move toward the traditional cost-based utility-style regulation set forth in the ratemaking methodology which the Commission established for Williams Pipe Line Company in Opinion No. 154-B.

In July 1988, the Commission issued an order in Buckeye Pipe Line Company which indicated the Commission's willingness to consider a lighter-handed approach to oil pipeline ratemaking than the cost-based ratemaking methodology set forth in Opinion No. 154-B, as modified by Opinion No. 154-C. The Commission directed the Administrative Law Judge to conduct the hearing in phases.

In FY 1989, the Commission continued work on the Buckeye Pipe Line case and considered the Texas Eastern Products Pipeline Company (TEPPCO) case. The Buckeye Pipe Line case is undergoing a phased hearing process and is still in litigation. Phase I was established to study the pipeline's competitiveness. If the oil pipelines prove that their rates are competitively constrained, light-handed rate regulation may be warranted. If they are unable to prove competitiveness, then a Phase II hearing of the more traditional cost-based methodology may be necessary.

Texas Eastern Products Pipeline Company requested light-handed regulation in an interlocutory appeal dated September 6, 1988. The Commission addressed this matter in an order issued November 28, 1988. The Commission directed TEPPCO to demonstrate that it lacks significant market power before the Commission determines whether TEPPCO must comply with the Opinion No. 154-B methodology to justify its proposed proportional rates.

The Commission expects to act on these two landmark cases in FY 1990. The outcome will significantly affect the Commission's future ratemaking policy for the oil pipeline industry.

Flexibility in the design of rates for oil pipelines is desirable in many cases. In the development of a ratemaking methodology, the Commission may consider minimum and maximum operating rate levels for these carriers. The issue is developing standards which can be applied in these cases.

Depreciation Reviews

Oil pipeline companies depreciate their assets based on rates established by the Commission. The Commission analyzes and develops rates applicable to the original cost of property. Depreciation expense represents a significant portion of the total operating expenses of a company. Depreciation then, has a direct impact on both the company's net income and its rates. Depreciation rates are presently reviewed on a 5-year cycle.

Financial Audits

The Commission administers the Uniform System of Accounts established for oil pipeline companies through financial audits. Staff audits the financial books and records of new oil pipeline carriers and pipeline systems to ensure that the financial information filed with the Commission complies with Commission regulations and that the original cost of carrier property is properly stated for ratemaking purposes. Certain modifications must be made to accounting requirements contained in the Uniform System of Accounts to reflect the ratemaking principles in Opinion No. 154-B.

A continuing program of compliance audits is necessary in order to provide assurances to staff and to the Commission that oil pipelines are properly following the principles of original cost ratemaking and that the operating expense accounts are consistent with the Commission's accounting requirements.

Remedial Orders and Adjustment Request Denials

Section 503(c) of the Department of Energy Organization Act (42 USC § 7193(c)) provides for review of orders issued by the Secretary of Energy pursuant to Section 503(a) of the Act, and initiated by notices of probable violation; proposed remedial orders; or other formal, administrative initiating documents issued on or after October 1, 1977, which are contested by the recipient. The Act initiated responsibility for these activities for FERC. The Commission established formal procedures, similar to court trials, for these hearings. Further, it delegated the responsibility of presiding over these hearings to its Office of Administrative Law Judges.

FY 1989 Accomplishments - Oil Pipelines

- Completed staff presentations in the first phase (competition determination) of the Buckeye case.
- Completed and issued Commission initial orders/decisions in three formal cases (Southern Pacific, Cook Inlet, and KK Appliance Co.).
- Successfully dealt with all tariff filings within statutory time frame.

Oil Pipeline Workload

General Filings and Rate Increase Filings continue to be received at a reduced level during FY 1989 due to the impact of the new methodologies contemplated in the on-going formal Buckeye case. This case is forging new regulatory ground for the oil pipeline industry.

A further result of these new methodologies is the impact on Commission staff processing time. Staff is required to spend greater time in their work on formal cases due to the fact that most of the same issues are being contested in concurrent cases. With resolution of the lead case, filing levels and staff processing time will return to normal. Depreciation Order receipts and completions are expected to continue at a level pace through FY 1991.

During FY 1989, staff completed 18 appeals of DOE remedial orders and 1 review of adjustment request denials. Pending workload at the end of FY 1989 was 33 and 4, respectively. It is projected by the end of FY 1991 that 18 remedial orders and 2 adjustment request denials will remain pending, a reduction of over 45 percent from FY 1989. In general, overall pending levels are expected to decrease through FY 1991.

Table 17 - Oil Pipeline Workload

	Receipts			Completions		
	FY 1989	FY 1990	FY 1991	FY 1989	FY 1990	FY 1991
General Filings	198	300	250	190	300	250
Rate Increase Filings	6	10	12	5	10	12
Tariff (Formal Rate)	18	10	10	6	15	15
Depreciation Orders	35	30	30	32	33	33
Financial Audits	1	6	3	3	6	3
Review Remedial Orders	12	8	7	18	19	11
Adjust. Request Denials	0	2	2	1	3	3
Total	270	366	314	255	386	327

Table 18 - Workload Pending at End of Fiscal Year

	FY 1988	FY 1989	FY 1990	FY 1991
General Filings	7	15	15	15
Rate Increase Filings	0	1	1	1
Tariff (Formal Rate)	45	57	52	47
Depreciation Orders	10	13	10	7
Financial Audits	3	1	1	1
Review Remedial Orders	39	33	22	18
Adjust. Request Denials	5	4	3	2
Total	109	124	104	91

Federal Energy Regulatory Commission
FY 1991 Congressional Budget Request

ELECTRIC POWER REGULATION

Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1989 Actual	FY 1990 Appropriation	FY 1991 Request
Electric Power Regulation - Operating Expenses	$24,503	$25,266	$26,448
FTE's	335	353	359

Authorization:

Electric Power Regulation: Federal Power Act; Public Utility Regulatory Policies Act; Powerplant and Industrial Fuel Use Act; Department of Energy Organization Act; Energy Security Act; Regulatory Flexibility Act; Crude Oil Windfall Profit Tax Act; Pacific Northwest Electric Power Planning and Conservation Act; Flood Control and River and Harbor Acts; Bonneville Project Act; Eklutna Project Act; Falcon and Amisted Dam Act; Federal Columbia River Transmission Act; Reclamation Project Act; Nuclear Waste Policy Act; National Environmental Policy Act; Endangered Species Act; the Public Utility Holding Company Act; and the Regulatory Fairness Act.

Goals of the Electric Power Regulation Program:

- Establish just, reasonable, nondiscriminatory and nonpreferential rates for the transmission and sale for resale of electric power by public utilities in interstate commerce.
- Ensure that rates charged by Federal power marketing administrations conform to statutory requirements.
- Administer the qualifying facility program under the Public Utility Regulatory Policies Act (PURPA).
- Promote efficient performance of electric utilities.

Specific Objectives for FY 1991:

- Provide a flexible regulatory framework that can respond quickly and effectively to the changes taking place and that will continue to take place in the electric utility industry.
- Stimulate competition whenever possible and remove unnecessary regulatory barriers to achieve an efficient electric utility industry.
- Process all applications within statutory time limits.
- Develop generic rulemakings on electric regulatory issues and procedures to reduce case-by-case litigation, and expedite action on issues such as parallel path transmission flows.
- Continue to foster settlements in the formal investigations area.
- Administer the Uniform System of Accounts and a program of financial audits.
- Maintain a high productivity level consistent with adjustments for changes in the complexity of workload.
- Complete the biennial review of energy and fuel purchase practices under automatic adjustment clauses as mandated by Section 205(f)(2) of the Federal Power Act (FPA).
- Process timely matters relating to qualifying facility (QF) status.
- Process requests for waiver of certain Commission rules obligating purchases and sales of electric power from QF.
- Closely monitor through public use forms and reliability council reports the effects on electric power reliability, supply, transmission and pooling resulting from electric utility mergers, restructuring, and competitive changes in the electric industry.
- Promptly resolve all proceedings instituted pursuant to the Regulatory Fairness Act.
- Ensure prompt and constructive coordination with states and interest groups on issues of mutual regulatory concern.

The Federal Power Act requires the Commission to establish just, reasonable, nondiscriminatory and nonpreferential rates for wholesale electric sales and the transmission of electric energy in interstate commerce. Wholesale sales transactions historically have been divided into two distinct categories: requirement sales and coordination sales. Requirement sales involve a long-term commitment to provide firm power to meet all or part of the buyer's load. Coordination transactions involve the sale or exchange of electricity between utilities that normally have sufficient generation to meet their own loads.

Coordination sales generally are shorter and less firm than requirement sales, and the revenues from coordination sales are used to reduce the rates to requirement customers. Power purchased at wholesale is becoming more important as a source of supply for the electric power delivered to ultimate consumers. Nationwide, power purchased at wholesale provides about a third of the supply of electricity for sales to ultimate consumers.

The Commission also:

- has authority over agreements for the interconnection of utility systems and transfers of power by utilities including pooling agreements;
- has authority over mergers, acquisitions, sales and dispositions of jurisdictional facilities of public utilities, and certain issuances of utility securities;
- has authority over certain interlocking relationships between top utility officials and certain firms doing business with these utilities;
- is responsible for ensuring that rates charged by DOE's power marketing agencies comply with statutory standards and regulations developed by the Secretary of Energy; and,
- processes applications pursuant to PURPA for qualifying status as a cogeneration or small power production facility.

Competitive Pressures

Historically, the electric industry has significantly contributed to the Nation's economic well-being. However, there are a number of factors that could hamper both the adequacy of future power supplies and reliability, and inhibit further efficiency gains in the industry. The problems of unstable capital markets, high interest rates and volatile fuel prices have recently been part of the business environment within which all firms must operate, but are of particular sensitivity to the electric industry. As a result of such factors, combined with concerns about adequate rate recovery and after-the-fact prudence reviews of utility projects, many utilities are reluctant to pursue large generation facilities and unproven technologies. Utilities are also facing competitive pressures resulting from the entry of nontraditional generators into the power business, and technological improvements in generation and transmission.

Due to the growing interest by the industry and customers in more flexible pricing arrangements, the Commission in the past few years has been presented with an increasing number of complex and innovative proposals which depart from traditional rate regulation. The Commission is in the process of reviewing its rate and corporate regulation of the electric utility industry to respond to the changing character of the industry, and to encourage greater supply options and more efficient allocation of existing supplies.

Since there may no longer be a natural monopoly in generation of electric energy, the Commission believes that one way to provide adequate, reliable, and more efficient supplies of electric power is to capitalize on the potential for more power supply competition by encouraging cogeneration and small power production facilities and by lessening the regulatory barriers to entry into the generation market of nontraditional power producers. Many utilities are contemplating purchases from independent power producers in lieu of utility construction. This will generate a new breed of wholesale contracts. Additionally, as various states implement bidding systems which include purchases from independent power producers, the Commission will need to deal with an increasing number of filings for rate approval of the resulting contracts.

Comprehensive Regulatory Framework

The Commission has begun implementing plans to encourage more supply options and to provide greater regulatory flexibility so that electric utilities can be more market responsive.

Efforts are continuing to determine whether the rates of certain non-QF independent power producers should reflect market-based pricing rather than the internal cost of the seller. Independent power producers may at times be in a better position than conventional utilities to take risks as major and supplementary power suppliers, to employ new technologies, and to optimally utilize the Nation's pool of recognized plant design, construction, and operating talent. Since these entities, by definition, would not possess market power, they would be entitled to benefits that are commensurate with the risks taken in constructing and operating new power facilities. The streamlined market-oriented rate and corporate regulation proposed for independent power producers in the Commission's notice of proposed rulemaking (RM88-4-000) is designed to develop discussion and offer an approach to addressing this issue.

The Commission has begun to address a state's ability to use more efficient market systems to establish rates for QF purchases and to prioritize purchases of capacity from qualifying facilities under PURPA. Bidding may help to promote risk-taking by conventional utilities by offering to utilities' investors the possibility of market-based rewards which better reflect the degree of risk that is undertaken with regard to the construction of power production facilities. In order to assure that utilities are not forced to pay for qualifying facility capacity that is not needed and to assure that qualifying facilities are not over or undercompensated, as required by PURPA, the Commission has proposed, in RM88-6-000, to improve its rules governing the administrative determination of avoided costs by state authorities and non-regulated electric utilities. Finally, in RM88-17-000, the Commission has proposed to amend its rules governing the certification of qualification of facilities under PURPA, to reduce the administrative burden on both the applicant and the Commission through the codification of procedures developed during the decade since the passage of PURPA.

The Commission currently is attempting to ascertain the extent to which the pricing of bulk power sales between conventional utilities might be made more responsive to prevailing market conditions. In determining whether utilities

should be allowed to have greater pricing flexibility, the staff will have to analyze the degree of market power which a utility has in a particular sales arrangement. The Commission is also examining its regulation of transmission service. Transmission is a complex and key component of more efficient electric markets. Although competition in the transmission sector of the industry is virtually nonexistent, it is possible that transmission pricing could be modified to better account for unintended power flows, and to encourage greater voluntary transmission access and more efficient transactions, through variations on embedded cost or marginal cost pricing. These efforts, particularly the complex issues involved in transmission reform, will require extensive staff time.

Wholesale Rates

The Commission acts on filings to establish or change the rates, terms, and conditions for the transmission or sale at wholesale of electric energy in interstate commerce. To expedite the process, the Commission has delegated authority to the staff to act on certain routine and noncontroversial applications. More than 85 percent of the rate filings are completed through these delegations.

The Commission may suspend a proposed rate increase for up to 5 months and order that the rates be collected subject to refund. For those rates which appear to be excessive, an investigation is initiated. A settlement conference is scheduled to permit an opportunity for staff, the utility, the affected wholesale customers, state commissions and any other intervenors to resolve differences and arrive at mutually acceptable terms. Approximately 80 percent of the investigations are resolved through the settlement process. If settlement attempts are unsuccessful, the matter then proceeds to a formal hearing before an administrative law judge.

In processing rate filings, the Commission has had to address several major issues. These issues include construction work in progress (CWIP), plant cancellations, prudence, diversification, tax reform, and complex bulk power arrangements.

CWIP - In 1983 the Commission changed its policy in setting wholesale rates to allow up to 50 percent of qualifying CWIP in rate base, in addition to pollution control and fuel conversion CWIP. However, the court remanded portions of the Commission's CWIP rule because of "price squeeze" and "double whammy" antitrust concerns.

"Price squeeze" is price discrimination that has an anticompetitive effect directed against a utility's wholesale customers. "Double whammy" may occur when a customer, planning to leave or reduce its reliance on its supplying utility's system, constructs and pays for its own generating facilities and is simultaneously required to pay rates supporting the supplying utility's investment in future generating capacity.

On June 18, 1987, and September 17, 1987, the Commission issued a final rule on CWIP (Order Nos. 474 and 474A). The final rule prescribed treatment of CWIP filings generally and established procedures and guidelines for addressing and remedying potential anticompetitive effects of CWIP in rate base.

The court affirmed the Commission's general treatment of "price squeeze" and "double whammy," but remanded to FERC for further consideration, the appropriate standard for preliminary relief from alleged CWIP-induced price squeeze. On August 3, 1989, FERC issued an Order on Remand (Order No. 474-B) adopting a revised Standard for preliminary relief. Under the revised Standard, a party requesting preliminary relief from alleged CWIP-induced price squeeze must show that it is likely to be harmed in some way if the requested non-pollution control/fuel conversion CWIP is allowed. Upon such a showing, the Commission will balance the respective interests of the party seeking preliminary relief, the public utility applying for non-pollution control/fuel conversion CWIP, and the public in determining whether to grant preliminary relief.

Although the CWIP issue has declined in significance during the past few years and is not expected to be a major issue in FY 1990, new construction may begin again in FY 1990 and FY 1991, which may reestablish CWIP as a significant electric rate issue in FY 1991 and later in the event of utility construction in lieu of utility purchases.

Plant Cancellation - The Commission formerly permitted a utility to amortize and recover in rates prudently incurred costs associated with abandoned or cancelled plants. However, the Commission did not permit a return to be earned on the unamortized balance. On September 30, 1985, the Commission agreed to New England Power Company's request to reexamine the Commission's policy regarding the treatment of the costs of cancelled plants. On January 15, 1988, the Commission issued Opinion No. 295 that reaffirmed the intent of the Commission, as established in Opinion No. 49, to balance the interests of ratepayers and shareholders so as to require a sharing of the losses in cancelled or abandoned plants. However, Opinion No. 295 refined the earlier policy by requiring an explicit 50/50 sharing of the loss between the ratepayers and the shareholders, with the utility allowed to place the unamortized portion of its 50 percent in rate base and with an amortization period which reflects the expected life of the plant had it been completed.

Prudence - The issue of prudence in management action has the potential to exist in all rate cases. While the prudence of utility management decisions heretofore was largely confined to plant additions, the focus of allegations of utility imprudence seems to be gradually expanding to include operational imprudence as well, including fuel purchase practices. In cases where prudence issues are raised, the utility's decisions must be reviewed to ascertain whether a specific item or series of items (such as a review of the decisions relating to construction of a new generating plant) were prudently made based on the knowledge available at the time the decision was made. The party alleging imprudence must make a showing which raises a serious doubt about the prudence of the utility's course of action. The amount of staff time required for prudence analysis varies. At a minimum, where a state decision addressing

the imprudence claim has already been issued, staff must independently evaluate the facts and reasoning of any state decision. In the absence of any evidentiary record compiled in a state proceeding, the entire evidentiary record must be compiled by staff and intervenors in proceedings before this Commission. This requires extensive data requests and substantial staff review of the responses. Field reviews may be required to review certain aspects of the utility's decisionmaking process.

Diversification - Because of the low level of utility construction in the past 10 years, many electric utilities have been in a surplus cash condition. This is due to the replacement of the allowance for funds used during construction with a cash return on rate base, and increased funds associated with deferred income taxes and book depreciation. After allocating this increased cash flow to the more immediate concerns of shoring up the utility's financial posture, some utilities embarked upon diversification ventures. In order to isolate these diversification ventures from the regulated utility portion of their companies, many utilities have elected to reorganize themselves under a holding company structure, wherein the regulated utility and nonutility entities are independent subsidiaries of the holding company. In the course of reorganizing, public utilities may "dispose" of their jurisdictional facilities, and such transactions are subject to Section 203 of the FPA. Thus, the recent surfeit of cash has led to an increase in diversification efforts which, in turn, has led to an increase in the number of corporate filings before the Commission.

In addition to increasing the number of corporate filings, diversification into nonregulated businesses by electric utilities complicates the rate of return issue in rate cases. The overall cost of utility capital is relatively easy to estimate. However, if the amount of revenue obtained from nonregulated businesses is significant, the overall cost of capital of the integrated operations may not be the appropriate allowed rate of return for the electric utility segment of the business. This situation occurs if the risk of the nonregulated operations is significantly different than the risk of the electric utility operations. This problem is one of identification of risks and the associated capital cost of the electric utility function for ratemaking purposes. This problem is encountered whether the utility reorganizes as a holding company or not.

The scope of rate of return testimony is being broadened to include techniques which isolate and rank the various business segments (both regulated and unregulated) of the utility according to risk. It is possible that electric utilities which have diversified should receive allowed rates of return which are not equal to the overall costs of capital for the company. Determinations of the allowed rates of return are becoming more subjective. This complicates the tasks of rate of return witnesses, administrative law judges, and the Commission.

Tax Reform - The Tax Reform Act of 1986 lowered the Federal corporate income tax rate of electric utilities. To ensure that utilities reflect the change in their rates in a timely manner, the Commission issued a final rule, Order No. 475, on June 26, 1987, effective the same date. The rule allowed utilities to

voluntarily make an abbreviated filing between September 15, 1987, and November 30, 1987, adjusting only the tax expense. Any utility that did not act voluntarily to reflect the reduced tax rate, either in an abbreviated filing or in a normal rate filing encompassing the entire cost of service, may be the subject of a "show cause" proceeding under Section 206 of the FPA. Any other utility costs may also be examined in a "show cause" proceeding.

The Commission has completed the evaluation of the abbreviated filings and all the filed reductions are now in place. Voluntary Tax Reform Act filings were made by 43 electric utilities, reflecting a total estimated annual revenue reduction of $70 million.

Another aspect of the Tax Reform Act concerns the timeframes for flowing back to ratepayers the surplus accumulated deferred income taxes that the change in corporate federal income tax rates has engendered. This issue will likely be raised in Section 205 or 206 proceedings.

Complex Bulk Power Arrangements - Bulk power arrangements have become more common and more complex. Transfers are both long and short term and reflect many cost, market, and competitive factors. These sales have significant impacts on ratepayers and the processing of these filings have required significant staff resources.

Regulatory Fairness Act Proceedings

On October 6, 1988, the President signed into law the Regulatory Fairness Act which amends Section 206 of the Federal Power Act to allow, in appropriate circumstances, refunds to ratepayers of excessive rates collected prior to final Commission action in Section 206 proceedings. Traditionally, the Commission could change a utility's rates only prospectively from the date of the Commission's ultimate resolution of the proceeding and ratepayers were not entitled to refunds of excessive rates collected prior to final Commission action. As a consequence of the additional refund authority that the Regulatory Fairness Act provides, the number of complaints filed under Section 206 of the Federal Power Act and the number of proceedings instituted under Section 206 are expected to increase.

Corporate Applications and Interlocking Positions

The Commission is responsible for acting on applications related to corporate transactions including mergers, property disposition and acquisition of jurisdictional facilities, and issuance or acquisition of securities by regulated public utility companies, and for acting on applications for authorization to hold certain interlocking positions between a public utility and other business entities. In addition, the Commission is responsible for establishing and maintaining a public record of interlocking positions, including certain types not requiring formal applications, and a public file of each utility's 20 largest purchasers of electricity.

During FY 1988, the Supreme Court upheld the determination that certain "limited" underwriting activities engaged in by commercial banks do not violate the Glass-Steagall Act. In January 1989, the Federal Reserve Board issued another ruling which allows commercial bank holding companies, through separately funded subsidiaries and subject to certain limitations, to engage in the underwriting of corporate debt securities. As a result of these actions, the Commission expects to see an increase in the number of interlocking directorate applications filed under Section 305 of the Federal Power Act since many directors of public utilities also serve as directors of commercial banks.

The Commission staff has met with several utilities to discuss their proposals for corporate restructuring. A number of other utilities have indicated that they are considering restructuring alternatives. There are many types of restructuring proposals. Each proposal is somewhat unique; moreover, all are relatively complex from ratemaking, accounting, and financial perspectives. As a result of the interest in restructuring, there likely will be increases in corporate applications filed pursuant to Sections 203 and 204 of the FPA. This increase in applications will not represent a significant increase in the absolute number of filings; however, there will be a significant increase in time expended per filing to process corporate applications due to the complex and unique nature of the issues presented by the restructuring activity. Hearings will also be required to consider some of these complex corporate applications, such as those undertaken regarding the merger between Utah Power and Light Company and PacifiCorp, and those currently underway regarding the proposed merger between Southern California Edison Company and San Diego Gas & Electric Company.

Federal Rate Reviews

The FERC reviews the rates for five power marketing administrations (PMAs). The PMAs are Bonneville Power Administration (BPA or Bonneville), Alaska Power Administration (APA), Southeastern Power Administration (SEPA), Western Area Power Administration (WAPA), and Southwestern Power Administration (SWPA).

The passage of the Pacific Northwest Electric Power Planning and Conservation Act (Northwest Act) in 1980 gave the Commission statutory authority to confirm and approve the power and transmission rates of BPA on both an interim and final basis. The authority to confirm the rates of the other four PMAs on a final basis was delegated to the Commission by the Secretary of Energy.

The review standards for Bonneville regional rates are similar to some of the standards found in the earlier acts that apply to the other four PMAs; however, these standards are stated in the Northwest Act in more general terms. The standards for BPA's nonregional, nonfirm rates are the same standards found in legislation passed before 1980 and set a higher standard of review over those rates than for regional rates. The Commission has issued opinions in BPA's FY 1981, FY 1982, and FY 1984 cases. The FY 1985 case is in the administrative hearing process. The regional rates for BPA's FY 1981-FY 1985 cases have been approved on a final basis by the Commission. The last of these was for the FY 1985 rate case which was approved on April 29, 1987. Included in that approval were three additional modifications to the 1985 rates filed

during 1986 as emergency rate changes to enhance BPA's revenues in a competitive power market during 1986 and 1987. A new case filed in FY 1987 is pending before the Commission. A decision on December 11, 1989, by the Ninth Circuit Court of Appeals, currently under Commission review, could affect the extent of the Commission's hearing.

Under the Northwest Act, the Commission also approves the rates under which BPA purchases power from Northwest utilities at their average system cost (ASC) for resale back to the participating utilities at BPA's preference rate. Investor-owned utilities (IOUs) that participate in this exchange program file their ASC rates with the Commission under Section 205 of the FPA. Since June of 1984, approximately 200 ASC rates have been filed pursuant to the methodologies approved in Order Nos. 337 (1984 ASC) and 400 (1986 ASC). Under both ASC methodologies, BPA reviews the ASC rate developed by the participating utility for conformance with the methodology. Each of the eight IOUs participating in the ASC program then files the BPA-adjusted ASC rate with the Commission.

The IOU and other affected parties may then contest the BPA decision before the Commission. Many of these rates have been contested and the issues raised are frequently both novel and complex. Presently, there are no contested ASC rates before the Commission. All prior ASC rates which were contested have either been decided by the Commission or settled. Based on experience, future ASC rate filings are expected to continue to generate controversy.

Western Systems Power Pool (WSPP)

On March 12, 1987, the Commission approved, as modified, the proposed WSPP bulk power marketing experiment. The voluntary 2-year experiment, which began operation on May 1, 1987, involves a 14-state region and currently includes 15 jurisdictional investor-owned utilities, the BPA, WAPA, British Columbia Hydro in Canada, and 10 nonjurisdictional entities. The experiment will test whether voluntary access to certain energy commodities and transmission services, and a greater exchange of market information through an electronic bulletin board, will increase efficiency, competition and coordination in the use of generation and transmission facilities and will result in lower consumer costs.

The pool affects coordination transactions only. Flexible pricing applies to marketing economy energy, unit commitment and firm system capacity and/or energy sale or exchange transactions and to marketing transmission services. For the energy commodity transactions, the prices are subject to ceilings based on costs associated with the highest fully allocated cost resources among participants during the prior year. Membership is open to any utility interconnected with a participant which owns or has entitlement to generation facilities and which operates its own control area or has appropriate arrangements with its control area operator. The experiment uses an electronic bulletin board to list daily buy and sell quotes. The participants may act both as buyers and sellers of energy and transmission in the pool. The pool does not alter or terminate any existing agreements among the participants, but constitutes an additional alternative arrangement.

The order requires the participants to report on the activities from the operation of the experiment. Interim reports were filed during FY 1989. Based on this information and at the request of the parties, the Commission extended the WSPP experiment for one year through April 30, 1990. Review of the experiment will continue through FY 1991.

Small Power Producers and Cogenerators

The FERC is empowered under Section 210 of PURPA to certify small power production and cogeneration facilities as qualifying facilities. Under the regulations that were enacted pursuant to Section 210 of PURPA, qualifying facilities are exempted from certain Federal and state regulation. Electric utilities are required to purchase the electric output at the utilities' full avoided cost, and to provide backup power to the facility.

Mergers, Interconnections, Wheeling, and Pooling

Some utilities are considering a departure from traditional vertical integration by separating all or part of the generation and transmission functions from the distribution function. In addition, new utilities are being formed to participate solely in the wholesale market. At the same time, other utilities are consolidating through acquisitions or mergers. Traditional relationships through pooling agreements may also see changes as individual member utilities become more competitive for independent supply sources outside of pooling mechanisms. These developments will generate novel arrangements requiring extensive and complex analysis for regulatory approval.

As the Nation's power systems become increasingly interrelated and complex through reliance on independent power producers and PURPA qualifying facilities, long-range transmission, and less vertically integrated utility systems, reliability issues will grow in significance. It is likely that this will put an added burden on the Commission to consider reliability issues in the context of the innovative wholesale and transmission rate filings, mergers, and corporate applications that it will be reviewing.

The Commission, upon application or on its own motion, can order the physical connection of the transmission systems of two or more utilities to provide for the sale or exchange of electric power (interconnection) if certain statutory criteria are met. The FPA also authorizes the Commission to order an electric utility to provide transmission service (wheeling) to permit noncontiguous utilities to enter into transactions for the sale or exchange of electric power. Prior to issuing such orders, the Commission must find, among other things, that the action is in the public interest, and that it will: (1) conserve a significant amount of energy; (2) significantly further the efficient use of electric generation and transmission facilities; or (3) improve the reliability of utility electric systems. The Commission must also find that any order issued would reasonably preserve existing competitive relationships.

Increased concern over potential capacity shortages and spot excesses in the 1990's may spur utilities and customers to request that FERC order wheeling. Few requests for mandatory wheeling have been received by the Commission

although the wheeling issue is becoming a major issue in the qualifying facility area. The varying power production costs from region to region are prompting qualifying facilities to seek to sell their output to electric utilities other than the facility's host electric utility. The level of industry inquiries and contacts which involve transmission agreements are on the increase. Several utilities have indicated that novel agreements are contemplated for the future and some (such as Pacific Gas & Electric's agreements with Turlock and Modesto) have been received and approved with conditions.

As the generation sector becomes increasingly competitive, there will be a growing need to assure that the regulatory approach to transmission services evolves in a compatible manner. The Commission established a Transmission Task Force to review these changing realities in transmission markets, evaluate new proposals for changing the regulation of transmission and ultimately advance new Commission policies for the regulation of transmission services. The Task Force issued the "Report to the Commission" in October 1989.

Automatic Adjustment Clauses

Automatic adjustment clauses permit electric utilities to adjust rates to reflect certain cost changes without requiring specific regulatory review and approval. The most common type of adjustment clause is the fuel adjustment clause, which reflects variations from an established base in the cost of fuel burned to generate electricity. PURPA directs the Commission to review, every 4 years, automatic adjustment clauses used in jurisdictional rate schedules, and to review energy and fuel purchase practices of utilities using such clauses every 2 years to ensure efficient use of resources. A company found to have improperly billed wholesale customers under the provisions of an automatic adjustment clause is ordered to refund any excess amounts with interest. The Commission will commence the next biennial review in FY 1990.

Financial Audits

An essential element in the Commission's Electric Power Regulation program is the existence of reliable financial accounting information which is based upon sound accounting principles that are uniformly applied to all jurisdictional companies. This accounting information is necessary in order to provide the Commission the information it needs on investment costs of facilities, the cost and types of capital used to finance such investments, and operating costs and revenues in order to establish just and reasonable rates under Sections 205 and 206 of the FPA and to determine compliance with the rate schedules on file. These needs are essentially met through the establishment and maintenance of a Uniform System of Accounts for Public Utilities and Licensees, through requirements for periodic financial reporting, and through a program of financial audits of jurisdictional companies. These functions are carried out through authorities granted under Sections 4, 208, 301, 302, and 304 of the FPA.

The accounting information obtained from financial statements prepared under standards uniformly applied to all regulated utilities forms the basis for measuring both historical economic performance and compliance of billing practices to the terms of approved tariffs. Additionally, the accounting

information is used to determine the adequacy of current rates and provides the foundation for constructing ratemaking models useful for the development of future rates.

The required assurances that the Commission must have that the basic financial information used in its economic regulation is sound and reliable is obtained essentially through a program of financial audits. These audits are conducted on a cyclical basis. Approximately 60 percent of the 203 utilities subject to the Commission's accounting regulations are audited on a 4-year cycle. The remaining companies are audited more or less frequently depending upon such factors as the extent to which automatic adjustment clauses are used, the frequency of rate filings, and other similar considerations. The audits, which are conducted on-site by field auditors, encompass selected reviews of rate matters as well as audits of the basic financial statements and related books and records.

Transmission Parallel (Loop) Flow

Utilities are increasingly seeking compensation for use of their transmission system due to transactions to which they are not a party. The hearing of such issues can potentially increase litigation time since the highly technical information required to analyze them often requires lengthy discovery periods. If instituted, the prefiling of specific information at the time of a complaint on rate filing could enable the Commission to better determine whether to direct the parties to pursue settlement or expedite the hearing process.

Monitoring of Industry and Coordination with State and Industry Groups

The issues of reliability, transmission access and pricing, including parallel path flow compensation, QFs and other nontraditional power producers will require coordination and contact by the Commission with affected State Commissions, reliability councils, power pools, other industry groups, and industrial utilities, so as to keep abreast of trends and problems expressed by those who either run or regulate the utility industry. This effort includes continued close Commission support of DOE/EIA information collection such as the Annual Power System Report, Form EIA-714 and the Nonutility Power Producer Report, Form EIA-867, and DOE's Electric Reliability Council IE-411 Reporting. Additionally, the Commission may see an increased level of notification of anticipated electric shortages under Section 206 of PURPA as reserve margins fall in some regions. This will require increased analysis by staff to assure that wholesale customers are treated fairly in any load reduction plans.

Management Initiatives

A number of management initiatives previously implemented continue to speed up the processing of electric rate cases and reduce backlogged and pending workload. The Commission's Office of Electric Power Regulation (OEPR) has coordinated with the Office of the General Counsel to establish specific processing schedules for electric rate cases awaiting Commission opinion. Periodic meetings are held to review the progress on and status of each case and to update target dates for submission of draft opinions for Commission

consideration. Existing cases, as well as anticipated new cases, are considered in developing processing schedules not only to eliminate backlogged cases but also to process all new cases in a timely manner.

In FY 1989, the Commission concluded the fifth annual generic rate of return proceeding under which a benchmark rate of return was established for the industry. The benchmarks are updated quarterly and are advisory. However, the Commission has directed parties and administrative law judges to carefully consider the generic rate of return in making return on equity recommendations in individual rate proceedings, which will increase staff requirements. In the most recent quarterly update, the advisory benchmark return was set at 12.04 percent for rate case filings made during the period from November 1, 1989 through January 31, 1990.

The annual rate of return procedures have enabled the Commission to have a national forum for annually evaluating the financial condition of the jurisdictional electric utilities and to solicit views from the public on the appropriate return to be allowed on common equity.

The Commission continues to regard the expeditious resolution of formal electric rate cases as one of its highest priorities. To this end, the Commission conducted a 2-year test of methods to improve case handling. As a result of this test, which ended in 1986, a "fast track" procedure was implemented for all future routine electric rate cases designated for hearing. Since 1986 approximately 55 percent of the electric hearing cases have been designated for "fast track" procedures.

In April 1987, the Commission switched from use of the Energy Information Administration (EIA) computer facility to an internal microcomputer based system for processing cost of service analyses (ECOS). The ECOS system offers analysts enhanced analysis capabilities, data security, a consistent format for data management and faster results. The agency benefits from computer cost savings and greater potential for reducing the time needed to produce cost of service related work products. Using ECOS, the analyst may view the results of a cost of service study within 10 minutes of initiating an adjustment. ECOS benefits the industry by allowing utilities to evaluate their cost of service submission on a personal computer, using the exact formulas and program that will be used by FERC. ECOS was released to the industry in March 1988.

Also in place is the Computer Assisted Depreciation and Life Analysis System (CADLAS), which has widened staff capability in calculating various aspects of depreciation for the preparation and presentation of testimony and exhibits. These programs have increased productivity and has saved the Commission thousands of dollars in contract and computer access fees. The Commission has received over 300 requests from utility companies, state commissions and other interested parties for copies of CADLAS.

Work has been completed on a micro-computer based program that enables staff to verify site-specific nuclear plant decommissioning cost estimates, reduce certain kinds of activities to verifiable levels, and make appropriate adjustments where necessary. The programs will add an important enhancement to staff's testimony in litigated proceedings.

In process is the conversion of the Finance Program from EIA's mainframe system to an in-house microcomputer-based system. This conversion will provide more effective control over database integrity, while providing flexibility and control over the creation of reports vital to efficient financial analysis operations, and achieve significant cost savings to the Commission.

FY 1989 Accomplishments - Electric Power

- Completed more than 1,500 workload items including over 500 small power producer and cogeneration filings.
- Continued to monitor the recent trend toward restructuring within the industry to determine impact on cost of capital to utilities and on system reliability.
- Completed the biennial review of all energy and fuel purchase practices under automatic adjustment clauses, as mandated by Section 205 (f)(2) of the Federal Power Act.
- Reviewed and approved the reasonableness of generating plant performance indices (equivalent availability) as targets in innovative formula rates (incentive rates).
- Continued to establish just and reasonable rates for transmission and resale services of electric utilities.
- Continued prudence reviews of completed generation units, using rate decisions of states to establish prima facie cases.
- Ensured that rates charged by DOE's power marketing agencies complied with statutory standards and applicable regulations.
- Continued processing petitions for waiver from certain regulations under Part 292, subpart C, pursuant to Section 210 of PURPA.
- Continued processing applications for exemption from certain filing requirements under Section 133 of PURPA.
- Maintained surveillance over the accounting and financial reporting practices of jurisdictional electric utilities. Audit findings contained in reports during FY 1989 resulted in substantial adjustments to rate base accounts which will translate into reductions in customer rates. The audits also resulted in direct customer refunds due to improper cost of service or fuel adjustment clause billings.

- Held hearings on the Notices of Proposed Rulemaking in Docket No. RM88-17-000 dealing with regulations governing qualifying facilities applications.

FY 1991 Resource Requirements

The Commission is requesting a total of $26,448,000 and 359 FTE's for the Electric Power Regulation program in FY 1991, an increase of $1,182,000 over FY 1990 and an increase of 6 FTE's. The increase in funds is due to an increase in contractual funding for regulatory studies and this program's share of fixed cost increases.

Table 19 - Electric Power Workload

	Receipts			Completions		
	FY 1989	FY 1990	FY 1991	FY 1989	FY 1990	FY 1991
Rate Filings	632	680	730	625	680	730
Formal Inves. Rate Level	47	55	60	47	50	60
Compliance Level	104	105	105	99	105	105
Formal Inves. Other	12	12	12	38	12	12
PURPA §133 Exemptions	10	4	4	12	4	4
Small Power (QF)	156	150	150	186	150	150
Cogeneration (QF)	319	300	300	326	300	300
Corporate Applications	17	30	30	22	30	30
Interlocking Positions	69	95	95	57	100	100
Securities-Negotiated	13	25	25	12	25	25
Securities-Competitive	23	30	30	28	30	30
Financial Audits	32	33	33	39	33	33
Contested Acctg. Cases	8	6	6	17	6	6
Federal Rate	15	8	8	9	12	10
Total	1,457	1,533	1,588	1,517	1,537	1,595

By the end of FY 1991 the pending workload will be reduced to 335 cases, about 17 percent less than FY 1988. Table 20 illustrates the level of pending workload for each category in the Electric Power Regulation program.

Table 20 - Workload Pending at End of Fiscal Year

	FY 1988	FY 1989	FY 1990	FY 1991
Rate Filings	85	92	92	92
Formal Inves. Rate Level	73	73	78	78
Compliance Level	30	35	35	35
Formal Inves. Other	45	19	19	19
PURPA §133 Exemptions	2	0	0	0
Small Power (QF)	45	15	15	15
Cogeneration (QF)	33	26	26	26
Corporate Applications	8	3	3	3
Interlocking Positions	8	20	15	10
Securities-Negotiated	2	3	3	3
Securities-Competitive	7	2	2	2
Financial Audits	42	35	35	35
Contested Acctg. Cases	19	10	10	10
Federal Rate	7	13	9	7
Total	406	346	342	335

Federal Energy Regulatory Commission
FY 1991 Congressional Budget Request

Program Distribution of Resources
($000's)

	FY 1989 Actual	FY 1990 Appropriation 1/	FY 1991 Request
NATURAL GAS REGULATION	$ 54,739	$ 55,636	$ 57,301
Pipeline Certificates	19,739	22,042	24,050
Pipeline Rates	27,553	28,300	29,743
Producer Regulation	7,447	5,294	3,508
HYDROPOWER REGULATION	26,050	30,626	35,795
Hydropower Licensing	12,167	12,062	15,282
Dam Safety Inspection	10,015	11,299	12,583
Project Compliance and Administration	3,868	7,265	7,930
OIL PIPELINE REGULATION	2,615	3,390	3,206
ELECTRIC POWER REGULATION	24,503	25,266	26,448
TOTAL COMMISSION	$107,907	$114,918	$122,750

1/ Original FY 1990 appropriation of $116,550,000 was reduced by $1,632,000 under the FY 1990 sequester.

Federal Energy Regulatory Commission
FY 1991 Congressional Budget Request

Object Class Summary
($000's)

		FY 1989 Actual	FY 1990 Appropriation 1/	FY 1991 Request
11.0	Personnel Compensation	$ 64,371	$ 66,280	$ 68,414
12.0	Benefits	9,637	10,323	10,818
13.0	Benefits for Former Personnel	37	45	70
	Subtotal	74,045	76,648	79,302
21.0	Travel & Transportation of Persons	1,849	1,860	1,981
22.0	Transportation of Things	87	96	87
23.0	Rents, Communications, & Utilities	11,001	12,339	12,901
24.0	Printing & Reproduction	1,896	1,875	2,000
25.0	Other Services	16,001	18,830	21,844
	Contracts	4,476	6,449	10,124
	Support Services	8,154	9,181	8,520
	Energy Information Administration	3,371	3,200	3,200
26.0	Supplies & Materials	1,311	1,455	1,510
31.0	Equipment	1,707	1,815	3,125
42.0	Claims & Indemnities	10	0	0
	TOTAL	$107,907	$114,918	$122,750

1/ Original FY 1990 appropriation of $116,550,000 was reduced by $1,632,000 under the FY 1990 sequester.

Federal Energy Regulatory Commission
FY 1991 Congressional Budget Request

Summary of Full-Time Equivalents (FTE's)

	FY 1989 Actual	FY 1990 Authorized	FY 1991 Request
NATURAL GAS REGULATION	750	744	729
Pipeline Certificates	252	266	271
Pipeline Rates	387	403	411
Producer Regulation	111	75	47
HYDROPOWER REGULATION	373	425	437
Hydropower Licensing	162	152	157
Dam Safety Inspection	152	170	178
Project Compliance and Administration	59	103	102
OIL PIPELINE REGULATION	39	48	45
ELECTRIC POWER REGULATION	335	353	359
TOTAL COMMISSION	1,497	1,570	1,570

Federal Energy Regulatory Commission
FY 1991 Congressional Budget Request

Contracts Summary
($000's)

	FY 1991 Request
NATURAL GAS REGULATION	
Cryogenics	$ 50
Environmental Compliance	4,600
Subtotal	$ 4,650
HYDROPOWER REGULATION	
NEPA and ECPA Environmental Compliance	$ 4,090
Headwater Benefits Studies	350
Publication of Legal Notices	300
Navigation Research	100
Seismic Dynamic Stability Analyses	40
Other Hydropower	
Preparation of Manuals/Reports/Handbooks	186
Computer Database Access	43
Subtotal	$ 5,109
ELECTRIC POWER	
Regulatory Studies	$ 100
PRORATED SUPPORT CONTRACTS	$ 265
TOTAL CONTRACTS	$ 10,124